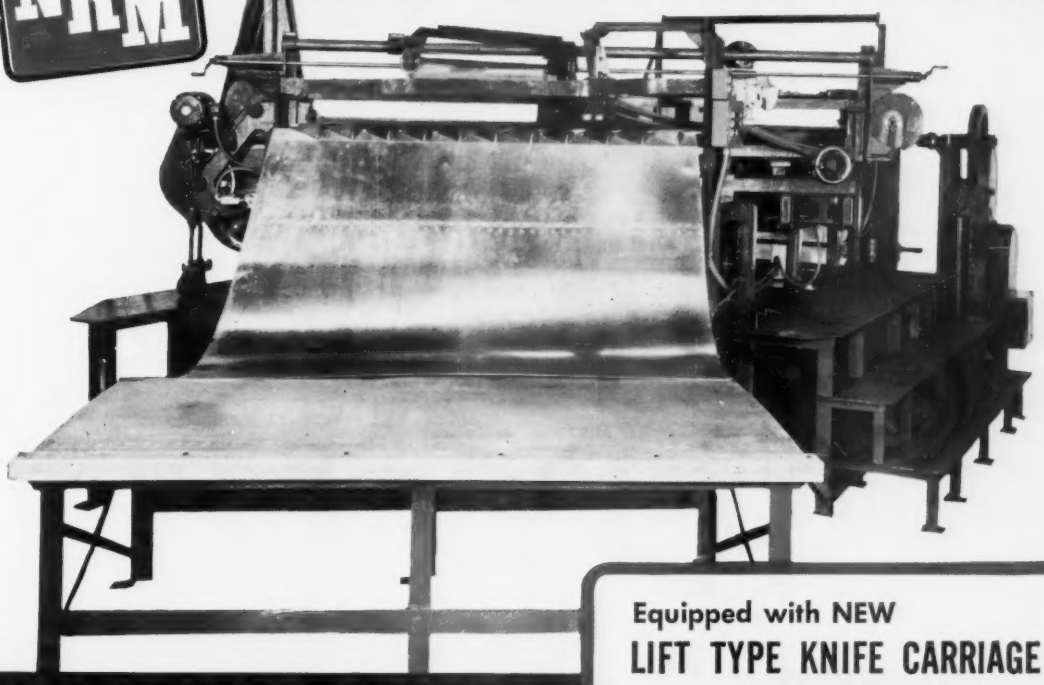
NRM

fully automatic

HIGH TABLE BIAS CUTTERS



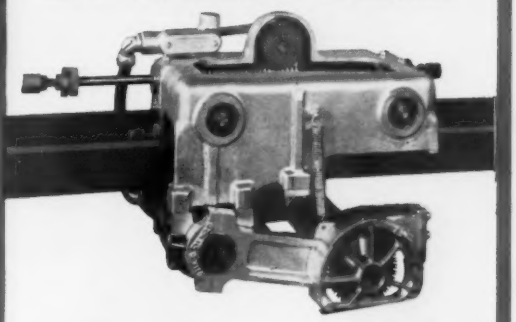
. . . FOR DIRECT SPLICING OF BIAS CUT FABRIC

- **18 SPLICES PER MINUTE** on fabric of passenger tire width.
- **AUTOMATICALLY RUNNING CUTTER** may be stopped or started at will by the splicer-operator.
- **ELECTRONIC SCANNER** is mounted stationary at end of cutter to advance one full block of stock with each table advance.
- **MOTOR DRIVEN CUTTER BAR** controlled from operator's station gives accurate width control.

The NRM High Table Bias Cutter was developed for direct splicing of bias cut fabric. As the cutter table advances, a full block of stock is floated down the chute and across the splicing table, in exact alignment with the previously cut piece. The operator has only to tack the end of one ply onto the other, with no risk of distorting the fabric. Spliced fabric may then be run directly through a calender for gum coating or hot application of tubeless lining, or may be wound into liners for direct servicing of tire building machines.

Equipped with NEW

LIFT TYPE KNIFE CARRIAGE



Designed especially to increase the speed of fabric cutting. A 1/2 HP, 3600 RPM motor drives the 1/32" x 3-3/4" dia. knife at 9,000 RPM, to provide up to 27 cuts per minute, depending on the type and width of fabric being cut. Only minor changes in the field are required to adapt this new-type cutter to your present NRM Bias Cutters.

2131-A

CONTACT US for engineering details and performance specifications on NRM High Table Bias Cutters.

NRM

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For excellent mold flow use Philblack A in your recipe. You'll have fewer imperfectly molded products . . . fewer rejects. And Philblack A imparts a soft, smooth, satiny finish and pleasant, rubbery "feel." Philblack A stocks are also noted for their smooth, easy extrusion characteristics and true-to-the-die accuracy.

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A — **Philblack A, Fast Extrusion Furnace Black.** Excellent tubing, molding, calendering, finish! Mixes easily. Disperses heat. Non-staining.

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I — **Philblack I, Intermediate Super Abrasion Furnace Black.** Superior abrasion. More tread miles at moderate cost.

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Rubber Age

COVERING THE MANUFACTURE OF RUBBER AND RUBBERLIKE PLASTICS PRODUCTS

AUGUST, 1959 VOL. 85 NO. 5

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*Appears every other month

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Highlights Sidelights *of the News . . .*

August, 1959

Sir Geoffrey Clay, Controller of Rubber Research and Chief Executive Officer of the Malayan Rubber Fund Board, has announced a $3.5 million research and development program for the Malayan rubber industry (page 811) . . . For an exclusive RUBBER AGE interview with Sir Geoffrey see page 812.

U.S. Rubber Co. and the Firestone Tire & Rubber Co. have been indicted on charge of illegally fixing the prices of synthetic foam rubber mattresses . . . The indictments stem from a major investigation of the rubber industry now pending before a Grand Jury in Chicago, Ill. . . . Both U.S. Rubber and Firestone were named in single count indictments . . . Each charge carries a maximum fine of $50,000 (page 815).

Annual RUBBER AGE awards in the amount of $100 each have been given to Dr. E. E. Bostick, a recent graduate of the University of Akron with a Ph.D. in chemistry, and to Robert H. Kellar, who recently completed rubber technology courses at the TLARGI Rubber Technology Foundation at the University of Southern California . . . Dr. Bostick is one of the first five students to graduate from Akron University with Ph.D. degrees (page 810) . . . Mr. Kellar is associated with the B. F. Goodrich Co. at Los Angeles (page 815).

Committee D-11 on Rubber and Rubberlike Materials of the American Society for Testing Materials met on June 23 to 26 at Atlantic City, N. J., in conjunction with the annual meeting of the parent society . . . The meeting featured a joint session of Committee D-11 and D-20 at which two technical papers were presented (page 801).

A tire factory now under construction in the Soviet Union will utilize about £14 million worth of equipment to be supplied by a group of British firms . . . Scheduled to produce 2 million tires a year, the plant is expected to begin production in 1960 (page 815).

Polymer Corp., Ltd., Sarnia, Ont., Canada, and the Oil, Chemical and Atomic Workers Union, have reached an agreement settling a 97-day strike at the company's synthetic rubber plant . . . The settlement provides for an across the board increase of 9¢ per hour (page 824).

Personalities in the news . . . R. P. Dinsmore, vice-president in charge of research and development for the Goodyear Tire & Rubber Co., has obsrved his forty-fifth year with the firm (page 805) . . . Simon Collier, nationally known authority in the field of industrial quality control and chairman of ASTM Committee D-11 on Rubber and Rubberlike Materials, has announced his retirement from the Johns-Manville Corp. (page 819).

CARBON BLACKS

Wyex EPC
Easy Processing Channel Black

Arrow MPC
Medium Processing Channel Black

Essex SRF
Semi-Reinforcing Furnace Black

Modulex HMF
High Modulus Furnace Black

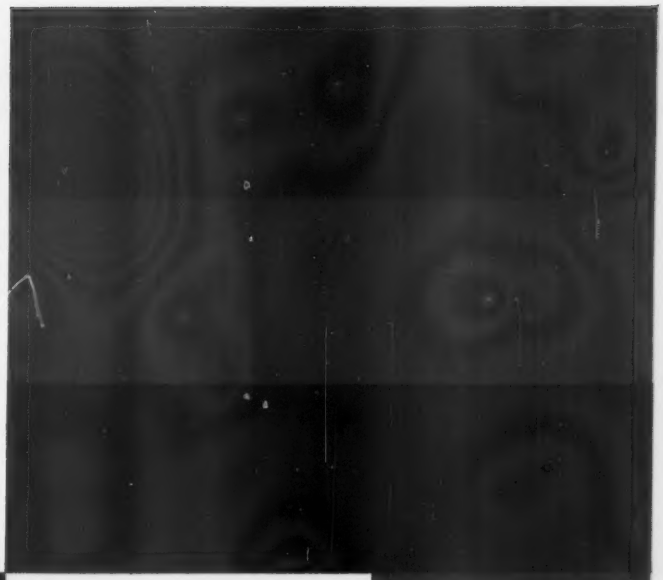
Aromex CF
Conductive Furnace Black

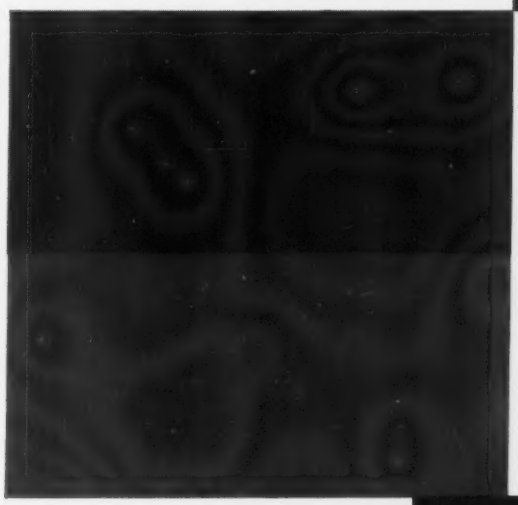
Aromex HAF
High Abrasion Furnace Black

Aromex ISAF
Intermediate Super Abrasion Furnace Black

Arovel FEF
Fast Extruding Furnace Black

Arogen GPF
General Purpose Furnace Black





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Suprex Clay
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LGB
Very low grit, high reinforcement

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*also available in spray-dried form

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*also available in spray-dried form

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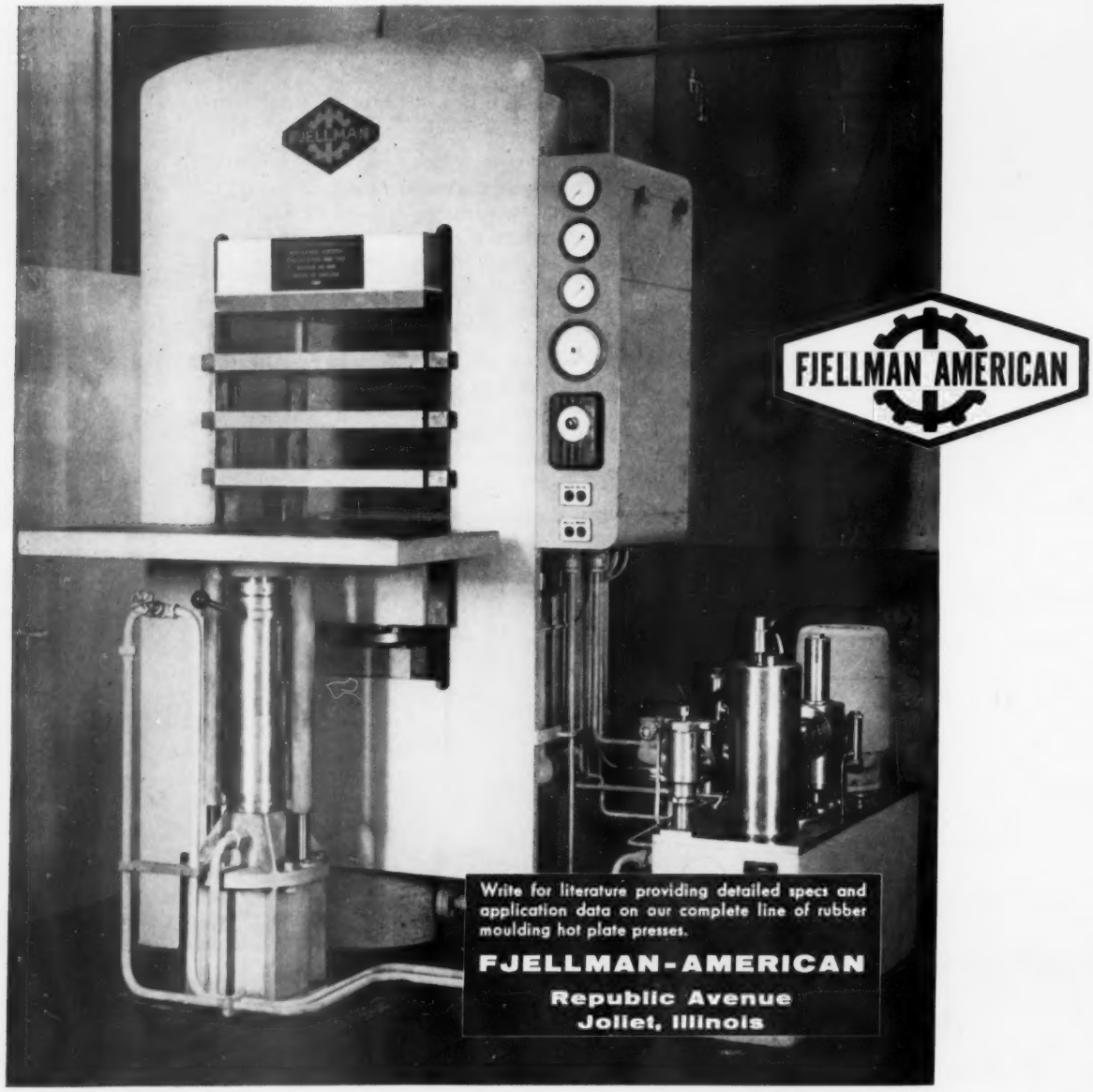
A complete line of heavy-duty, precision presses for all rubber moulding requirements: available 1 to 20 openings in platen sizes to 60″ wide x 200″ deep at any required pressure. Minimum delivery time. Complete engineering and installation services. May we make a plant survey and recommendation regarding your specific moulding press requirements.

Fjellman-American fully-automatic hot plate rubber moulding press with hydraulic operated positioner-loader-unloader. Four openings in platen size: 35″ wide x 27″ deep with 330 ton pressure.


FJELLMAN AMERICAN
Write for literature providing detailed specs and application data on our complete line of rubber moulding hot plate presses.
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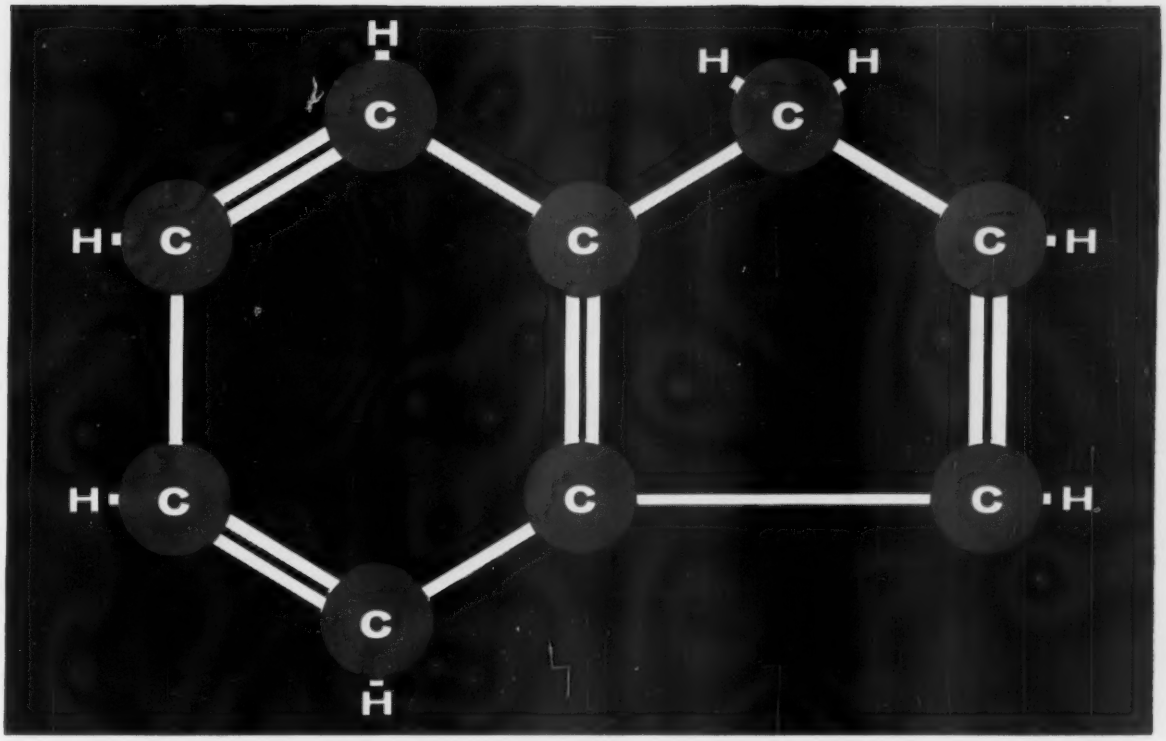
Republic Avenue
Joliet, Illinois



Neville Announces Production of HIGH PURITY INDENE

Neville is now in semi-commercial production of high-purity indene. It is a mobile, almost water-white, high boiling liquid, similar in appearance to monomeric styrene. The big potential interest in this new chemical lies in the fact that it has two reactive centers—the double bond and the methylene group—both in the five-membered ring fused to the benzene nucleus. Indene will polymerize or react to form a wide range of useful intermediates. Potential uses are indicated in the fields of polyesters, synthetic rubbers, copolymers, insecticides and repellants, drugs, dyes, plasticizers, antioxidants, surface active agents and synthesis of steroids and vitamins. Use your letterhead or the coupon below to write for a bulletin and sample.

Typical Inspection

Purity, % by Wt.	97.5
Freezing Point, °C.	—3.5
Specific Gravity 60/60°F.	1.0002
Refractive Index (n^{25}/D)	1.5726
Distillation Range (IBP-EP), °C.	180.0-186.0
Flash Point, °F.	173
Color (Saybolt)	+21 (inhibited)

Neville Chemical Company • Pittsburgh 25, Pa.

NEVILLE

☐ Please send bulletin on indene.
☐ Please send free ¼ lb. sample.
☐ Please send price schedule on larger quantities.

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COMPANY _____

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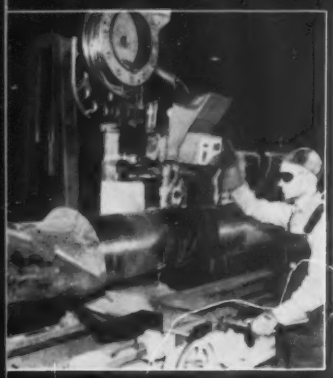
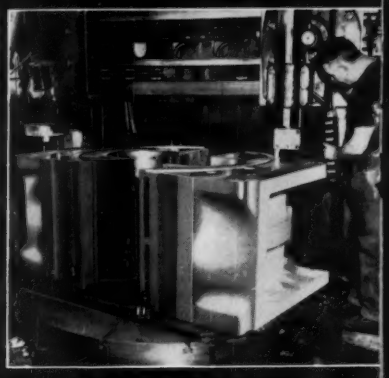


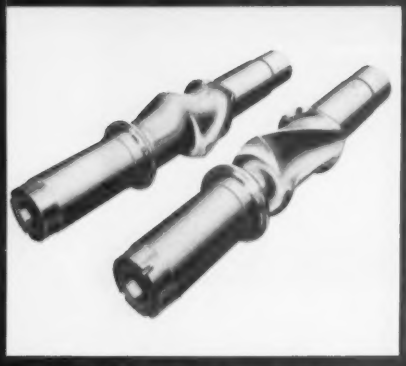
Automatic rebuilding of rotor necks replaces old hand methods.

End frames are equipped with new bronze bushings, then line bored after assembly to side.

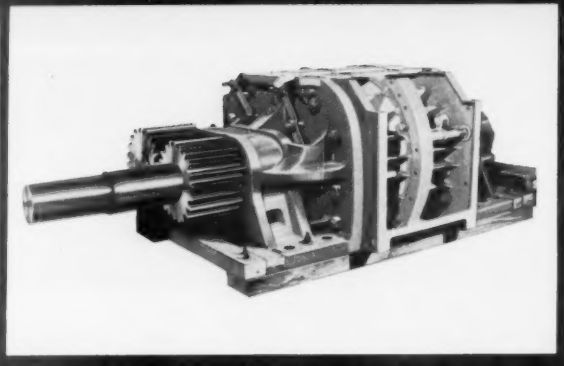
New yokes or gland rings with rotor collars Stellited and ground —new door top.



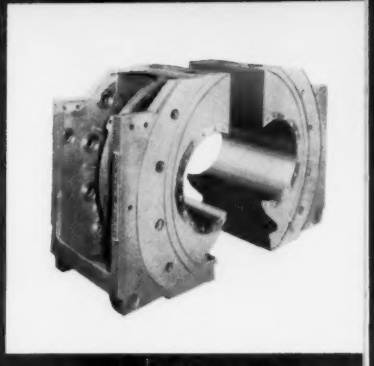
Machining new sides to template.



Rotors built up and ground to exact profile.



Complete assembly will fit any base. Except for rotors and end frames, all major parts are brand new.



New sides with dual metal liners.

Here's a Realistic Plan for Renewing BANBURY CHAMBERS

(1) We inspect and appraise the job without charge.

(2) Under direction of our competent erector, your own men can dismantle (and reassemble) on the site.

(3) During assembly, decisions on parts (to recondition or obtain new) can be made without delaying the job.

(4) Upon completion, all new parts not used or parts which can be renewed are returned to us for credit.

This method of renewing a Banbury has several advantages:

(A) Eliminates extra assembly charges. Your own maintenance force does the work.

(B) Allows opportunity to inspect and make your own decisions as to repairing parts or buying new ones.

(C) Trade-in credit is allowed on old machine parts suitable for reconditioning and re-use.

(D) Over-all result — a lower rebuilding cost.

One extra advantage of this method of Banbury Chamber renewal, as one Hale and Kullgren customer reports . . . "Our men now have a better understanding of the function and fitting of each component part, so that an intelligent program of preventive maintenance can be established."

Inquiries will be handled promptly.
Address Hale and Kullgren,
613 East Tallmadge Avenue,
Akron 9, Ohio.

BLAW-KNOX COMPANY
Aetna-Standard Division

Photo courtesy Ohio Rubber Company, Willoughby, Ohio, a Division of The Eagle-Picher Company.

How's this for a surefire success?

This thimble-size shield works inside an automobile engine. It clings to a pulsing valve stem, prevents excessive loss of engine oil—yet allows enough oil to properly lubricate the stem. Obviously, a tough job for a tiny part.

To do this critical job, rubber seemed the likely choice. But it would have to be a very special kind of rubber. It would have to withstand constant contact with oil, intense vibration and compression, wide temperature extremes and great tension.

Material selected: CHEMIGUM, the synthetic rubber that maintains its dimensional stability under blistering-hot oil attack and the most demanding conditions. Hundreds of thousands of these valve stem shields are now in use—meeting every operational requirement. And the constant uniformity plus the easy processability of CHEMIGUM make their production practical and profitable.

What can CHEMIGUM do for your product? For full details and technical assistance on CHEMIGUM—and a complete line of rubber chemicals and synthetic rubbers—write Goodyear, Chemical Division, Dept. H-9419, Akron 16, Ohio.

GOODYEAR

CHEMICAL DIVISION

Chemigum—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

Photo courtesy The Brunswick-Balke-Collender Company, Chicago, Ill.

How to prepare for a lifetime of "hard knocks"

This bowling ball—being test-bounced against a concrete-embedded steel plate—is headed for a lifetime of "hard knocks." It will be hurled down hundreds of maple lanes—crash into thousands of tenpins. Yet, it must retain its perfect shape, balance and weight.

To measure up to those exacting requirements, the nation's foremost manufacturer of bowling balls used to rely entirely on natural rubber. Now, a synthetic rubber is used that actually improves the quality of the compound. And that's PLIOFLEX by Goodyear. Mixed with natural rubber and other basic ingredients, PLIOFLEX has enabled the firm to give a *lifetime guarantee* with every ball it makes.

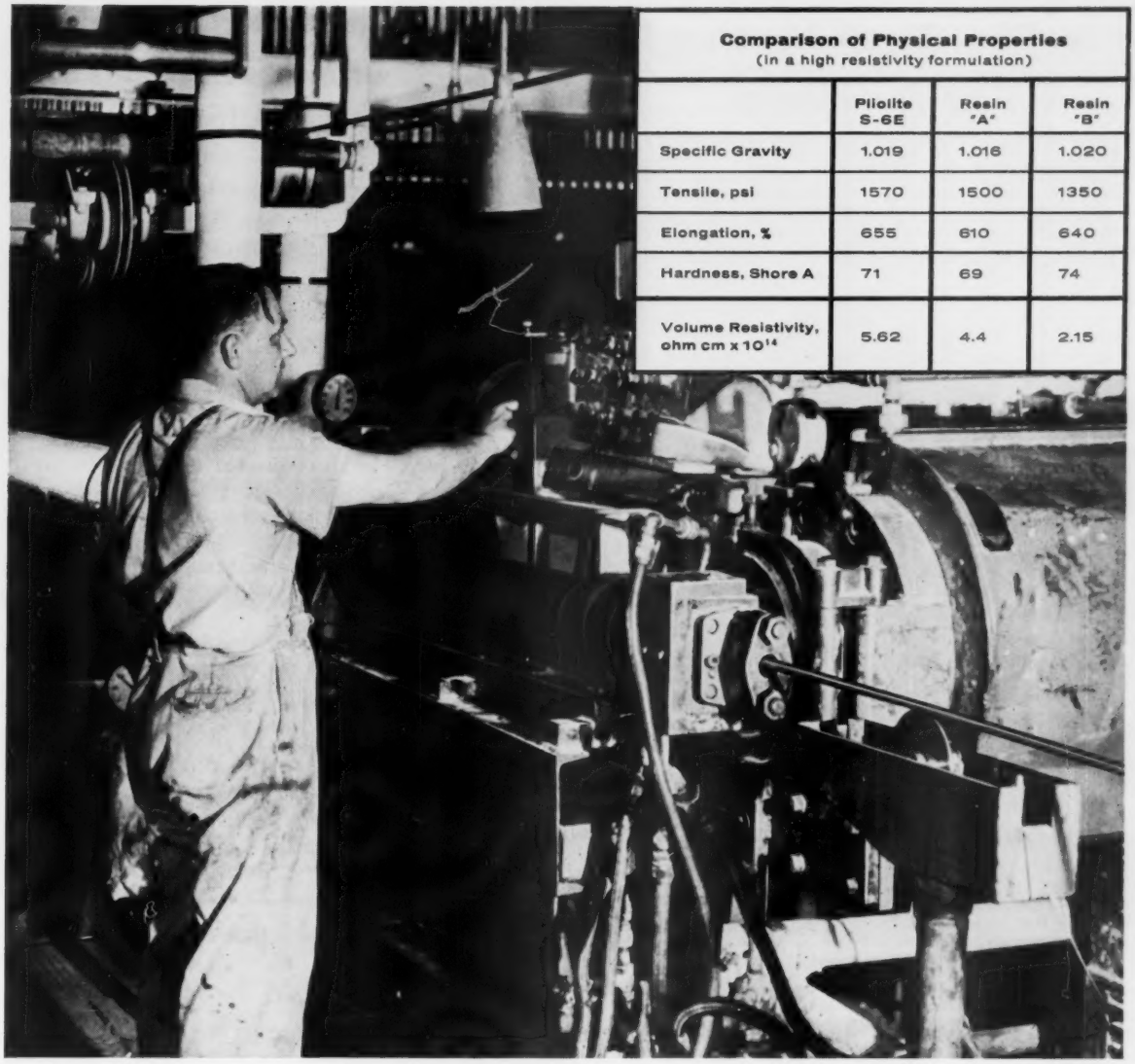
It has also made possible greater processing efficiency with resultant savings in time and money. The exceptional uniformity of PLIOFLEX is a key reason for this—along with its excellent dispersion characteristics and good color stability. These qualities help make the finished product a unique combination of precision craftsmanship and incredible toughness.

If you're looking for a material that can bowl over production problems—and improve product—PLIOFLEX may be right down your alley too. For full information, plus latest *Tech Book Bulletins* on other synthetic rubbers and rubber chemicals, write Goodyear, Chemical Division, Dept. H-9419, Akron 16, Ohio.

GOODYEAR

CHEMICAL DIVISION

Pliolflex—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio



Comparison of Physical Properties
(in a high resistivity formulation)

	Pliolite S-6E	Resin "A"	Resin "B"
Specific Gravity	1.019	1.016	1.020
Tensile, psi	1570	1500	1350
Elongation, %	655	610	640
Hardness, Shore A	71	69	74
Volume Resistivity, ohm cm x 10^{14}	5.62	4.4	2.15

Photo courtesy, The Okonite Company, Passaic, New Jersey

New way to meet tight wire "specs"—with ease!

It's here! PLIOLITE S-6E—the new electrical grade, rubber reinforcing resin that will enable you to meet tight wire covering specifications with ease. In trial plant runs, for instance, PLIOLITE S-6E has been particularly successful in meeting the requirements for covering on RHW and RW Wire.

PLIOLITE S-6E is a new high styrene/butadiene copolymer which not only exhibits superior electrical properties (see data above), but also processes and reinforces on a par with any resin on today's market. And best of all, it's offered at the same price as ordinary reinforcing resins.

We think you'll be pleasantly surprised at just how well PLIOLITE S-6E performs. But the best way to find out is to put it through its paces yourself. Samples and full details, including the latest *Tech Book Bulletins*, are yours by writing Goodyear, Chemical Division, Dept. V-9417 Akron 16, Ohio.

GOODYEAR

CHEMICAL DIVISION

Pliolite—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

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The Famous CUMBERLAND "Stair-Step" Dicer

Here at last is the answer to your problems of dicing rubber or vinyl sheet stock. Produces perfect cubes ranging in size from ⅛ to ½" by merely changing knives.

Comes in two sizes designed to handle sheets up to 7" or 14" in width. Other sizes made to order.

Input speeds range from 10 to 125 feet per min. depending on material and size of cube desired.

The CUMBERLAND Rotary Chopping and Dicing Machine

As a chopper, this machine efficiently cuts rubber and vinyl slabs into small pieces. Two sizes available to handle stock widths up to 14 or 24 inches.

As a dicer in modified form, handles principally vinyl sheet stock. A less expensive machine though less universal than the "Stair-Step" Dicer shown above.

For Granulating Plastic . . .
Investigate Cumberland's complete line of granulating machines. Request Bulletin 590.

Write for Complete Information

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DEPT. 3 · BOX 216 · PROVIDENCE · RHODE ISLAND
Builders of Better Machines for the Rubber and Plastics Industry

PATENT REVIEW

by Melvin Nord

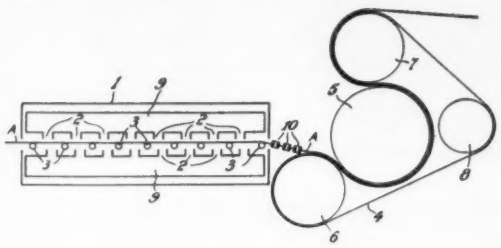
Vulcanizate with a Metal Salt Complex

U. S. Patent 2,862,037, issued November 25, 1958 to John K. Aiken and assigned to the Geigy Co. Ltd., disclosed a rubber composition which minimizes the ill-effects of copper and other heavy metals in water.

These effects can be minimized by incorporating into the rubber an alkali metal-alkaline earth metal complex of a polyamine polycarboxylic acid which forms stable water-soluble complexes with heavy metals, e. g., nitrilotriacetic or ethylene diamine tetra-acetic acids. The compounds do not cause discoloration of the rubber on exposure to light.

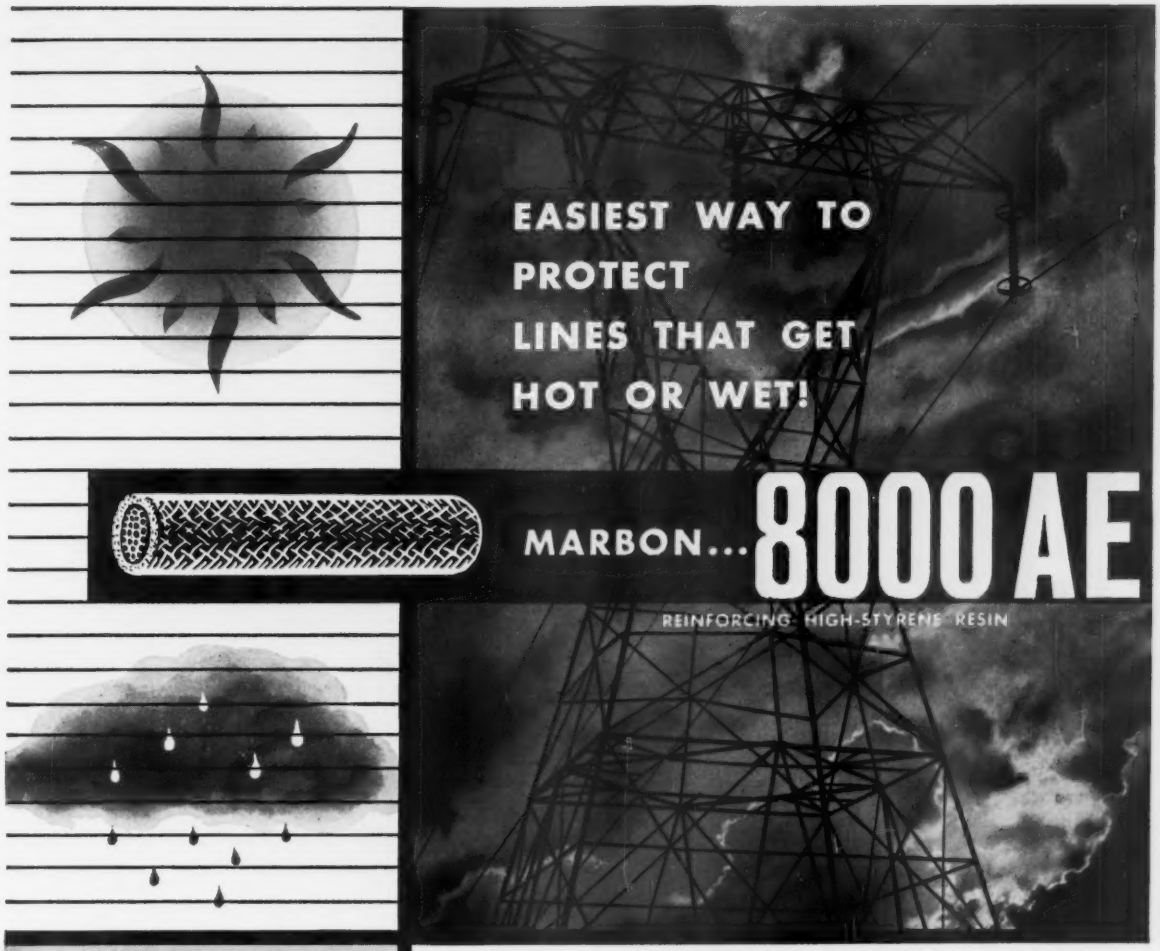
Conveyor Belting

U. S. Patent 2,859,482, issued November 11, 1958 to Fredrick W. Warren and John D. Crabbe, assigned to Dunlop Rubber Co. Ltd., describes a method of manufacturing conveyor belting containing one or more plies of textile fabric coated with a non-flammable thermoplastic composition. It is of particular usefulness in places where the risk of fire is great, e. g., in coal mines.



As shown in the schematic, a single ply (A) of belting fabric is coated on both sides with a plasticized polyvinyl chloride composition and is then passed through a tunnel (1) where hot air emerging from slots or nozzles (2) in ducts (9) impinges directly on both outer surfaces of the coated ply to fuse the compound. The ply is supported by rollers (3) which may be covered with a heat-resisting inert material such as polytetrafluorethylene or which may be in contact with licking rollers rotating in a trough of a heat-resistant lubricant such as silicone fluid. The hot air in the tunnel is returned to a heater and re-circulated. The edges of the belting ply are shaped square on emerging from the tunnel by passing them between spring loaded U-profiled rollers (10) which bear on the edges.

The underside of the coated ply (A) is then



MARBON 8000 AE GIVES YOU THESE PROVED ADVANTAGES!

- ★ Fast fusion at lower mixing temperatures
- ★ Faster, smoother extrusion—less scorch
- ★ Reduced overall cost
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- ★ High hydrocarbon content
- ★ Maximum electrical properties
- ★ Low moisture pick-up
- ★ Good resistance to heat aging
- ★ High tear and cut resistance

FOR SBR WIRE INSULATION COMPOUNDS...

Electrical insulation and jacketing that successfully resists critical heat and moisture problems is easier to produce . . . when SBR compounds are based on Marbon 8000AE. It's the superior electrical grade resin for fast high-hydrocarbon compounding — for smooth, fast extrusion or shrink-free calendering. You can count on more end-product advantages — outstanding electrical properties, increased toughness, plus all the reinforcing properties of Marbon 8000A. And you get improved processing . . . at lower cost.

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2—24" Rams
74" x 32" Pressing Surface

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THE FRENCH OIL MILL MACHINERY CO.
1022 Greene St., Piqua, Ohio

PATENT REVIEW

engaged by an endless flexible steel band (4), and the ply and band pass through the nip between a water-cooled rotating drum (5) and a lower drum (6) and are carried round the periphery of the cooled drum (5) for a distance of approximately two-thirds of its circumference, during which period the ply is compressed between the band and the periphery of the drum.

The ply (A) and band (4) then pass through the nip between the cooled drum (5) and an upper drum (7) and then round the upper drum. During its passage round the cooled drum (5) the coated ply is consolidated by the pressure exerted on it and the belting thus formed is sufficiently cool after passing round the upper drum to be stripped from the band and coiled up. The band follows a return path to the periphery of the lower drum round a tensioner (8).

Bonding Rubber to Substrates

U.S. Patent 2,837,458, issued June 3, 1958 to Elmer W. Coleman, Jr., and assigned to Lord Manufacturing Co., describes a method of bonding a body of rubber (either natural rubber or an unsaturated synthetic rubber) to a non-metal substrate.

Between the rubber and non-metal substrate, an adhesive layer is interposed which consists of a mixture of an organic isocyanate and a dithiocarbamic acid derivative (either a thiuram sulfide or a selenium dithiocarbamate).

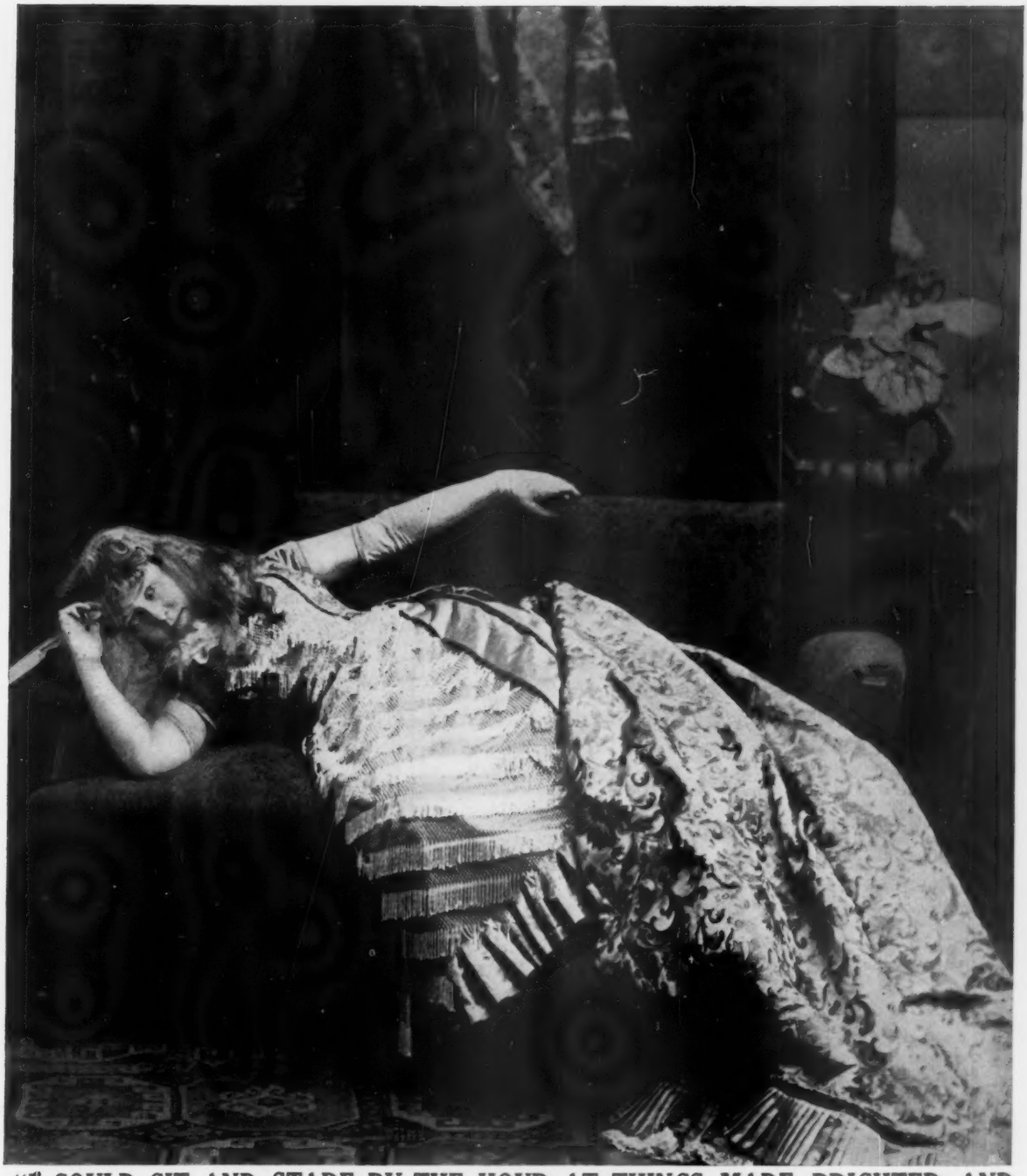
Tire Curing Press

U. S. Patent 2,858,566, issued November 4, 1958 to James W. Brundage, assigned to National Rubber Machinery Co., describes improvements in the control of the vulcanizing operation of a tire curing press.

One disadvantage of existing tire curing presses is that the entire diaphragm must be filled with the curing medium before any substantial curing commences, and likewise when the cure is completed the coolant has to fill the diaphragm before effectively commencing the arresting of the cure and cooling of the tire. Thus, the curing and cooling cycles consume more time than necessary, and moreover it is difficult to arrest the cure at exactly the right time.

Furthermore, existing tire curing presses are not well adapted for the curing of nylon tires, because these tires need to be cooled while pressure is maintained in the diaphragm. Otherwise, the nylon tires will be distorted if the supporting pressure of the diaphragm is removed or lessened during the admission of cooling water.

It is the main object of this invention to provide



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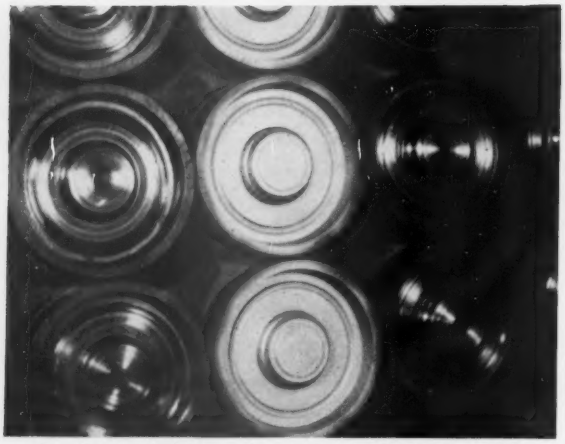

Product: Rubber oil seals & O-rings mold; manufacturer's name on request.

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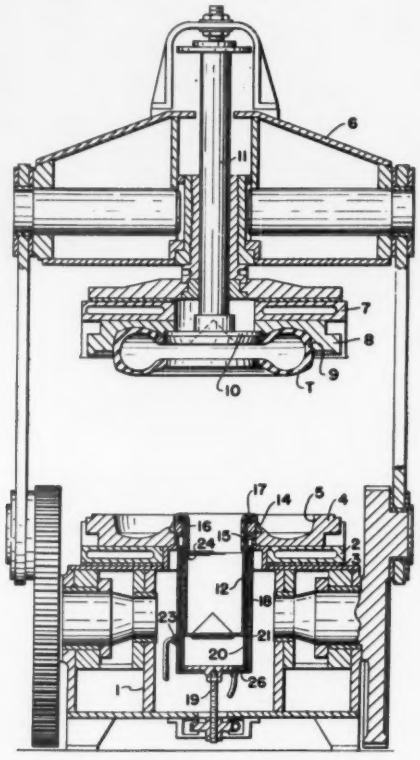
PATENT REVIEW

a tire curing press which makes a most efficient use of the curing medium and of the coolant by directing the hottest fluid or coolest fluid, as the case may be, against the tire-contacting wall of the diaphragm. Another object of the invention is to provide a tire curing press which is especially advantageous in the steam curing of nylon tires, in that the pressure is maintained within the diaphragm, as the cooling cycle is started, to avoid distortion of the nylon tires.



The tire curing press is schematically illustrated in the accompanying diagram. Curing medium or coolant issuing from passages (24) will impinge on the upper half of the tire-contacting portion of the diaphragm (12); and, because of the angular disposition of the passages (24), the curing or cooling fluid will be given a swirling motion around the inside of the diaphragm (12).

Flock-Coated Rubber Article

U. S. Patent 2,867,849, issued January 13, 1959 to Howard E. Drew, Albert L. Warden, and Edouard A. Brodeur, Jr., assigned to United States Rubber Co., relates to the manufacture of gloves deposited from rubber latex and having a lining formed of a coating of flock and rubber which is

SILICONE NEWS from Dow Corning

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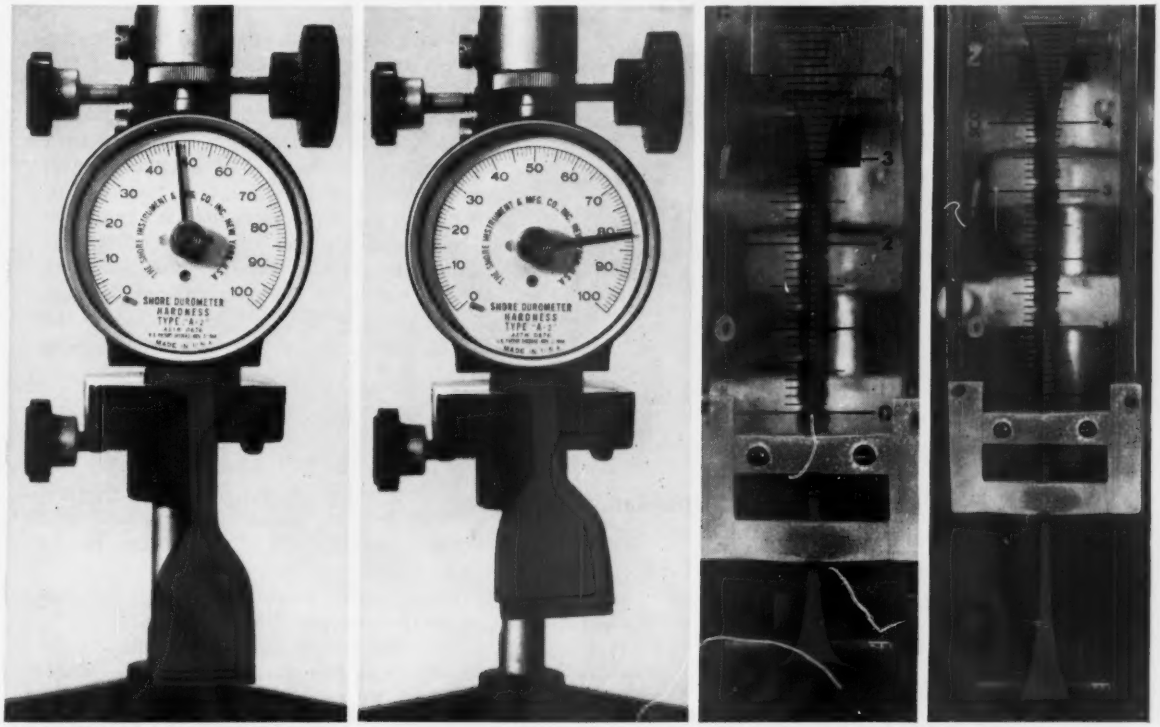

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All this, and a simpler inventory, too!

Sample Recipes and Typical Properties

. . . For 50 Durometer Silastic	
Silastic 433 Base	100 parts
Cab-O-Sil MS-7	7 parts
Celite Super Floss	3 parts
Luperco CSF or Cadox TS-40	1.8 parts
* Durometer (Shore A)	50
Tensile strength, psi	800
Elongation, %	240
Tear Strength, lbs/in	60
. . . For 80 Durometer Silastic	
Silastic 433 Base	100 parts
Cab-O-Sil MS-7	28 parts
Luperco CSF or Cadox TS-40	1.8 parts
* Durometer (Shore A)	80
Tensile strength, psi	700
Elongation, %	150
Tear strength, lbs/in	85

* Vulcanized 5 min. at 240 F; cured 24 hours at 480 F.

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MIDLAND, MICHIGAN

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PATENT REVIEW

provided with a slip-finish (that is, a finish having a relatively low coefficient of friction).

The rubber latex is compounded with the flock in such proportions as to obtain a large exposure of flock fibers after the mixture is applied to a predeposited rubber base. The flock coating is subsequently treated to reduce the tackiness of the rubber on the flock fibers and to expose the fibers by raising the ends of the fiber from the rubber bonding surface. This is accomplished by tumbling in hot water. The slip-finish is then obtained by halogenating the glove, including the latex flock lining, and drying and tumbling the gloves in heated dry air.

Film Casting Surface

U. S. Patent 2,866,717, issued December 30, 1958 to Kenneth E. Bristol, assigned to Goodyear Tire & Rubber Co., describes a method of preparing a non-blocking film, for use in the packaging industry.

Blocking—or the adherence of one film surface to another—is prevented in this invention by providing a film casting surface containing microscopic pits. The film thus produced has microscopic bumps on one side, which cause it to be non-locking.

In order to achieve this result, the resinous material used as the casting surface must be soluble in a volatile liquid which can be dispersed in a solution of the resin but remain immiscible with it and which is of lower volatility than the solvent. This is necessary in order to obtain evaporation of the volatile non-solvent after at least partial solidification of the resin. In this manner microscopic pits are created in the facing of the film casting surface.

Other Patents Of Interest

Subject	Inventor or Assignee	Patent No.	Date
Method for tire puncture repair	Goodyear Tire & Rubber Co.	2,866,494	12/30/58
Vulcanization accelerators	Goodyear Tire & Rubber Co.	2,866,777-8	12/30/58
Molding composition containing phenol-formaldehyde and rubber	Owens-Illinois Glass Co.	2,867,589	1/ 6/59

Copies of any patents, including those described here, are available from the Commissioner of Patents, Washington 25, D. C., for 25 cents each. Do not send stamps.

FIRST and LEADER...

In industry, too, to be "First" indicates leadership. Copolymer's many notable "Firsts" have identified them as the leader in the field of synthetic rubber. Among these accomplishments are:

First to produce cold rubber,
First to develop cold latex
for foam sponge, and,
First to produce commercially
a dispersant-free black
master batch.

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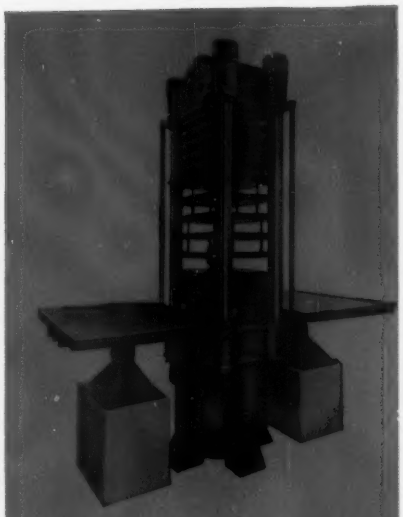
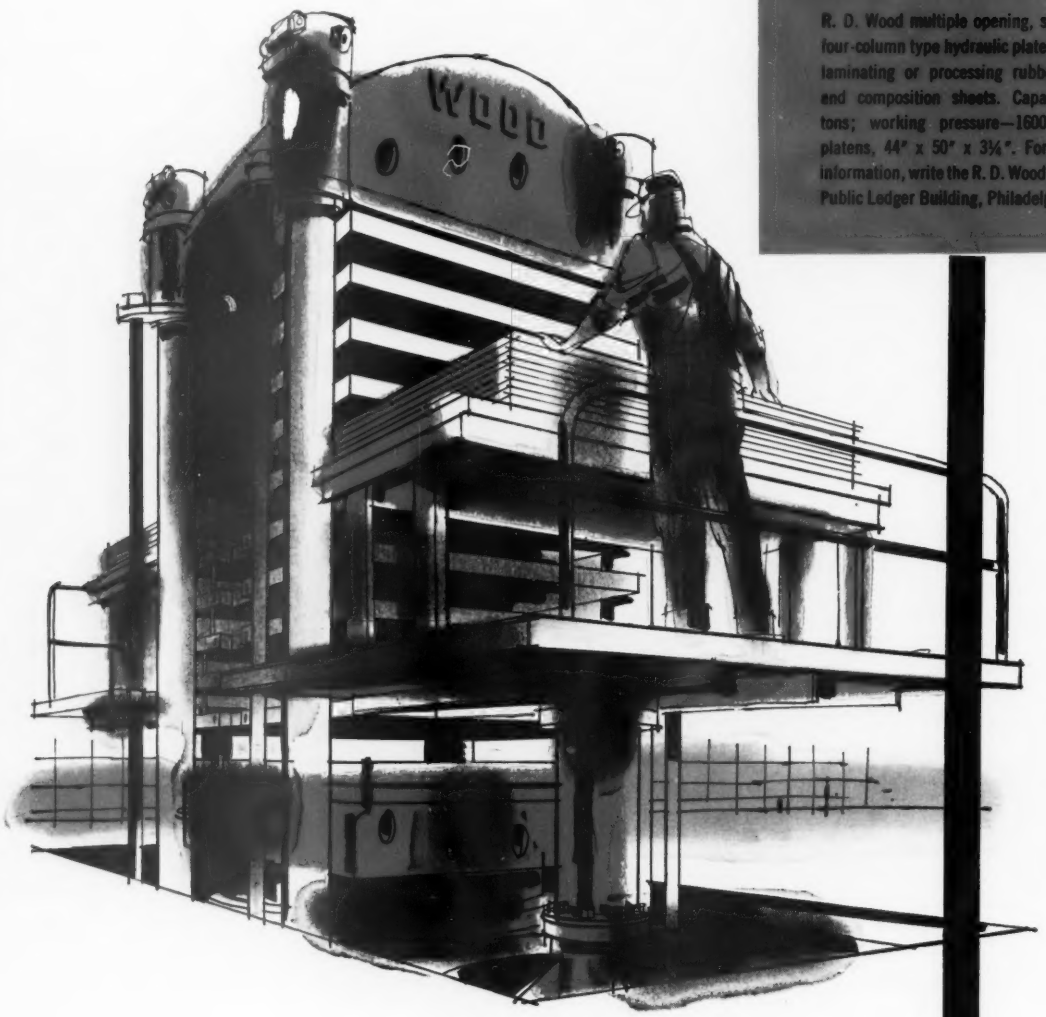
When you look at a new R. D. Wood press, you find every recent advance in press control and operation to meet the needs of today's automated production techniques. Yet there has been no sacrifice in basic design strength and rigidity so important to maintain continuous production runs. For example: the original model of the press shown below was built 25 years ago and is still in full operation. If you bought a Wood Press today, you'd receive the same fine quality which provides longer life . . . less maintenance. This is the type of service you expect when you buy a Wood Press.



R. D. Wood multiple opening, single ram, four-column type hydraulic platen press for laminating or processing rubber, plastic and composition sheets. Capacity—1200 tons; working pressure—1600 psi; 11 platens, 44" x 50" x 3¼". For complete information, write the R. D. Wood Company, Public Ledger Building, Philadelphia 5, Pa.



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Completely automatic, trouble-free performance. Dependable, quality production. Speediest installation. Least downtime (Sargent's exclusive design means easiest, quickest cleanout). Rugged construction. Incorporates every modern safety device. Designed for steam, extended surface heating elements, electric strip heating, or for added economy in natural gas areas, gas fired, direct or indirect. (Sargent pioneered the first successful gas-fired synthetic rubber dryer.) Advanced engineering by men who respect your requirements — A Sargent is Modern for Years to Come.

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LETTERS

Re Absorption Spectrum

Dear Sir:

In a recent article in your journal (March, 1959) entitled "The Absorption Spectrum of Carbon Black Dispersions," (1) we published ultraviolet absorption data for a number of commercial carbon blacks dispersed in white mineral oil, which showed marked similarities for different blacks.

Recently, A. Fiorenza, also in your journal (2) stated that the observed spectrum is not caused by the carbon black particles, but is due to extractable substances present in the black. As proof he claimed that the benzene extracts obtained from the carbon blacks, when dissolved in mineral oils, formed a clear solution, which showed ultraviolet spectra identical to those of the original blacks.

Now anyone familiar with the measurement of absorption spectra would immediately question Mr. Fiorenza's statements, for reasons of concentration. The blacks were all dispersed in a concentration of 10 parts per million. Since the extractables in the blacks varied from 0.00 to 0.09%, the highest concentration of extracts in the dispersions was below one part in 100 million! Such low concentrations of dissolved substances cannot be detected by present ultraviolet absorption methods. Moreover, the fact that blacks which do not have any extractables at all, such as acetylene blacks or Graphon, have these ultraviolet spectra, is enough evidence that Mr. Fiorenza's statements cannot possibly be correct.

We have repeated Mr. Fiorenza's experiments, by exhaustively extracting several carbon blacks with benzene. These completely extracted blacks showed ultraviolet spectra identical to those found before extraction, as is to be expected. The extracts, after complete removal of all traces of black by prolonged centrifuging, when dissolved in mineral oil, showed no ultraviolet absorption, not even in concentrations up to 10,000 times the concentration in the original carbon black dispersions!

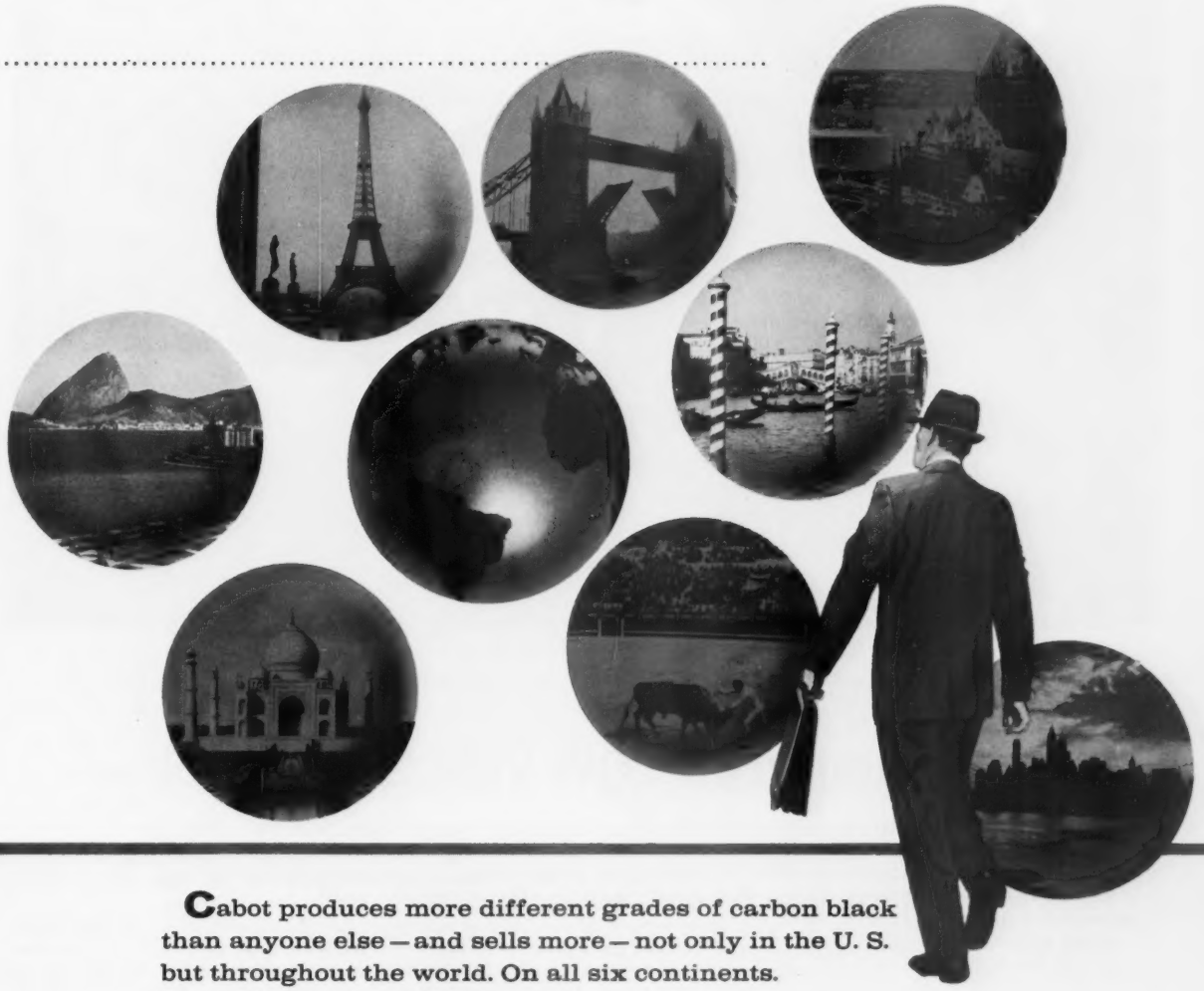
Mr. Fiorenza obviously omitted the centrifugal clarification step. As a result, he measured ultraviolet absorption data on very dilute dispersions of carbon black, leading him to an unwarranted conclusion about our data.

Summarizing, I wish to state that Mr. Fiorenza's recent criticism of our interpretation of ultraviolet absorption spectra of carbon black dispersions in mineral oil is not justified, since his criticism is based on inaccurate experiments.

ANDRIES VOET
I. M. Huber Corp.,
Borger, Texas

EDITOR'S NOTE: *A communication from Dr. Fiorenza will appear in the next issue of this journal.*

No matter where in the world you are, Cabot can serve you better



Cabot produces more different grades of carbon black than anyone else—and sells more—not only in the U. S. but throughout the world. On all six continents. In 58 different countries.

Cabot has more production facilities—abroad—than anyone else. Ships from more countries. Sells in more currencies. And Cabot is continually establishing new plants.

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125 HIGH STREET, BOSTON 10, MASSACHUSETTS

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If you manufacture rubber products that must be tough and durable . . . such as rubber soles or floor tile . . . here is good news for you!

New SP-103 resin-rubber masterbatch brings you both product quality and ease of processing. SP-103 is a blend of equal parts of *low*-Mooney polymer, and *high* styrene resin—giving you *shorter* processing time and *longer* wearing products. The cold rubber in SP-103 has a viscosity range of 30-38, providing a uniform mixture when added to a low viscosity compound.

Your in-plant mixing time is significantly reduced because the resin in SP-103 is added *at the latex stage*, and is already thoroughly dispersed when delivered. You gain, too, in reduced tendency to scorch because shorter mixing time means lower mixing temperature.

Still another valuable time-saving feature—SP-103 comes to you in free-flowing crumb form, minimizing loss of material and dust problems encountered with clear resins.

SP-103 is ideally suited for applications requiring good mold flow, plus excellent abrasion resistance and flexural strength in the finished stock. What is more, SP-103 is light in color—non-discoloring, non-staining—suitable for white and bright colored products.

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P. O. BOX 216, TORRANCE, CALIFORNIA

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capitol cues

THE FIRST REAL PROSPECTS OF TAX CUTS IN YEARS are emerging now in Washington, though actual relief is a year or two away. Hopes rest on (1) Ike's drive to cut Democratic spending, (2) the business upturn which is lifting profits—and revenues, and (3) interest in tax reform, to plug some leakages in the tax base. Reform may bring an extra $7 billion in revenue.

In the face of threatened Presidential vetoes, the Democrats cut bills for housing, airports, and depressed areas. Outlay will top Ike's $77 billion by only $2 billion in fiscal 1960, the year just starting. Revenues will exceed forecasts, so there's a chance of Budget balance. But a surplus available for tax cuts isn't likely until next year—in fiscal 1961.

The hearings on tax reform scheduled for next November will lend strength to the case for tax cuts. The reforms—the end of special exemptions—will mean more income subject to tax. The leakages which Congressmen are out to plug account for 25% or more of taxable income. The study will cover expense accounts, depletion for minerals, deductions for interest and medical expenses, income-splitting by married couples, etc.

BUSINESS IN THE SECOND HALF will continue to expand at a brisk rate—that's the size-up of leading economists in government and industry. The trend will be up even in the seasonally slow third quarter—the hot-weather period—though the sharpest gains will be coming in the final three months. By the beginning of next year, the stage should be set for a full-fledged boom. Though credit curbs will be tightening, two great plus factors will assure strength. They are rising consumer-durable sales and plant expansion.

Most key sectors of the economy will be showing substantial gains in the second half. Auto sales will continue solid, spurred by rising consumer incomes. Public works projects will be rising 10% or so. And buying for inventory should continue high—a dynamic factor in stimulating new business.

Here's what some key indicators will look like.

- Gross National Product: Total output of goods and services by year-end should be running at an annual rate of nearly $490 billion. The second-quarter rate was $478 billion.
- Industrial production: From the recent low 150's, the Federal Reserve Index will hit 156-7% of the 1947-49 level.
- Personal income: The second half rise will come to around $7 or $8 billion, reaching $383 billion by the end of 1959.
- Employment: A peak of 68 million will come in the month of October, compared with the present total of some 66 million.
- Inventories: The current $10 billion-a-year rate of buildup may dip to a still-high $6 billion rate in the last quarter.
- Auto sales: Fourth quarter volume may be up 25% over 1958.

CONSTRUCTION WILL BE HITTING NEW RECORDS in the second half of 1959. Home-building, which has been sensational so far this year, may slow a bit. But other types of work will expand more than enough to take up the slack. This will help not only the nation's builders, but businessmen generally. Construction is a big employer, user of materials, and buyer of equipment.

There are some powerful bases underlying this building boom. Government spending, particularly for highways, will move up. Growth of population is rapidly bolstering need for schools and housing, which in turn will lead to increasing need for stores, garages, and utilities. And rising costs are leading businessmen to build now, in anticipation of requirements.

Here is where the building gains are likely to come:
•Highways: Outlays will go up 5% or so, as the states rush to spend an extra $400 million in grants voted by Congress.
•Stores-offices: The 4% gain of the first half will double.
•Industrial: Spending will go up 5% over the current rate.
•Military: Dollar volume will rise 10% in the second half.
•Housing: Annual rate of starts will soon begin to decline. Today's annual rate of 1.3 million will fall to 1.1 million.

MORTGAGE MONEY WILL BE GETTING A LOT TIGHTER in the months to come. The supply of funds is up from a year ago but demand is rising a lot faster and interest rates are pushing higher. Conventional loans—those not backed by Federal insurance—are costing 6% in some areas. They'll go even higher. So lenders will be less willing to take on FHA loans—helping to explain why home-building activity will be declining somewhat by the end of the year.

THE GOVERNMENT'S WHOLESALE PRICE INDEX WILL RISE A BIT between now and the end of the year. The increase in these prices that businessmen pay will run ½%, maybe a little less than consumer prices. Boosts occurring in industrial items will more than offset the drops expected in farm products.

Here are some of the trends, price specialists foresee:
•Machinery will move up 5%, with the rise in business buying. The recession slump in investment kept makers from hiking.
•Non-ferrous metals will increase on higher wages and demand. Copper will be up 2¢ a pound or more...aluminum, 1¢-plus... lead and zinc, 1¢...tin, a slight gain...nickel, very little.
•Lumber will see a firming as mills revise output schedules.
•Cotton cloth is also firming as use tops '58 by some 20%.

SHORTAGES OF SKILLED HELP ARE DEVELOPING in many areas of the U.S. The Labor Department is getting reports of greater difficulty in recruiting from firms in Chicago, Baltimore, central New York, Ohio, and the Far West. The types of skills found in tightening supply include tool and die-makers, machinists, arc-welders, automobile mechanics, and electrical repairmen.

ANOTHER HUGE HARVEST IS LIKELY THIS FALL, say government farm experts, comparing well with '58's record. Plantings are high; weather has been good. The wheat crop will be down; corn will be larger—to a huge 4 billion bushels. Vegetable supplies will be greater than in 1958—mainly for celery and lettuce. Fresh fruits—peaches, apricots, and pears-will be in more abundant supply.

EXTRUSIONS

Here are a few of the thousands of extrusions made by Pawling Rubber Corporation.

Pawling Rubber reports:

"Faster, cleaner, smoother extrusions with AMERIPOL MICRO-BLACK masterbatch"

Pawling Rubber Corporation, Pawling, New York, turns out thousands upon thousands of stock and custom precision extrusions—in rubber, plastic and silicone—for the appliance, aviation, automotive, electronics and construction industries.

For a large portion of their synthetic rubber extrusions, Pawling uses Ameripol Micro-Black—the new, high-dispersion SBR masterbatch produced by an exclusive high liquid shear agitation process.

Since the carbon black is already integral in Micro-Black—and more thoroughly dispersed than in any conventional dry mix—Pawling gets these advantages by using Ameripol Micro-Black.

Extrusions are much faster and smoother, because of the superior dispersion of carbon black in Micro-Black.

Finished products have superior physical properties—greater tensile strength, greater stress resistance.

Pawling saves space by eliminating the storage of loose black, as well as the problems of weighing and mixing it.

Micro-Black gives them a cleaner, more efficient operation. No messy black to handle or clean up.

They save the time of 4 sweep-down cycles for black incorporation. This time-consuming operation is not required at all with Ameripol Micro-Black.

See how you can speed up production, improve your product and cut costs with new Ameripol Micro-Black. For complete information on the properties and applications of all 11 types of this high-dispersion masterbatch, write for new illustrated Micro-Black data book.

B. U. Adamson, Goodrich-Gulf Sales Engineer (left) watches M. A. Bedics, Chief Engineer of Pawling Rubber Corporation, make hardness test on a stock that includes Micro-Black masterbatch.

Goodrich-Gulf Chemicals, Inc.

3121 Euclid Avenue, Cleveland 15, Ohio

Tensile strength is high

Ratio of natural rubber to SBR	Tensile Strength—125 Part Loading		Tensile Strength—150 Part Loading	
	Super Multifex	Multifex-MM	Super Multifex	Multifex-MM
50-50	2,400 psi	2,030 psi	2,110 psi	1,890 psi
25-75	2,440 psi	2,200 psi	2,120 psi	2,020 psi
0-100	2,140 psi	2,000 psi	2,000 psi	1,790 psi

Tear strength is high

Ratio of natural rubber to SBR	Tensile Strength—125 Part Loading		Tensile Strength—150 Part Loading	
	Super Multifex	Multifex-MM	Super Multifex	Multifex-MM
50-50	270 pit	240 pit	300 pit	225 pit
25-75	225 pit	200 pit	240 pit	200 pit
0-100	200 pit	175 pit	220 pit	200 pit

TENSILE—

up to 2,400 psi

TEAR—

up to 300 pit

with Super-Multifex® and Multifex-MM®

Compare the amazing performance of these Diamond precipitated calcium carbonates with the much lower tensile and tear strengths of compounds containing ground limestone.

See for yourself how Super-Multifex and Multifex-MM improve the physical properties of *your* SBR compounds. And give new high strength to rubber adhesives, too!

For information and technical help on these and other precipitated calcium carbonates, call your Diamond Representative today. Or write Diamond Alkali Company, 300 Union Commerce Building, Cleveland 14, Ohio.

Diamond Chemicals®

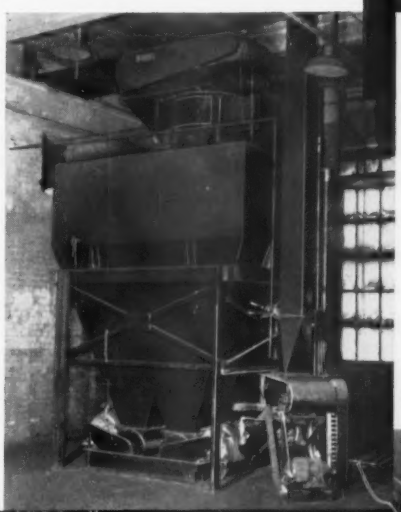
KENNEDY

KNOWS CARBON BLACK HANDLING

This is the story of Kelly-Springfield's new carbon black distribution and proportioning system at Cumberland, Md. All controls and the proportioning elements of the system were supplied by KENNEDY VAN SAUN.

Learn more about this and the many other KENNEDY installations in rubber plants throughout the world. A qualified representative will be pleased to call upon you without obligation.

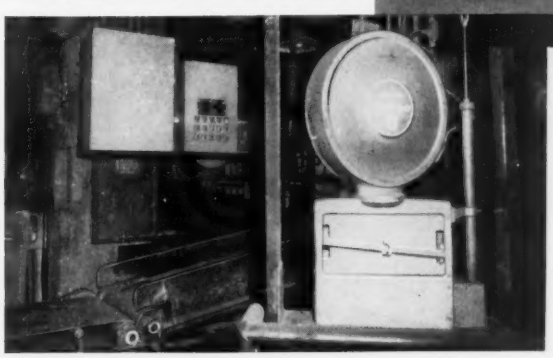
As each of the seven varieties of carbon black is unloaded, it is routed to its own storage bin compartment from this KENNEDY control panel.



From central storage, any four of the blacks are routed to compartmented service bins directly over the four Banburys. Note also the facilities for handling "return" black from dust filter.

A KENNEDY control center with graphic panel provides automatic centralized control of the entire distributing system.

The blacks required for each Banbury batch are weighed in sequence with unparalleled accuracy under completely automatic control. Each ingredient weight and the tare weight are automatically checked within prescribed tolerances.



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MANUFACTURING & ENGINEERING CORPORATION

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LIGHTER...BRIGHTER...BETTER...

Light, bright, pastel shades have captured the public fancy in an exciting new, sales-making way... for everything from housewares to automotive parts and accessories. And colored rubber products sell *best* when they *retain* their color... resist discoloration and staining as well as provide all the other properties associated with a quality rubber product.

To give the manufacturer new opportunities in the field of light-colored rubber products, TEXUS has recently developed two important new rubbers: SYNPOLS 8200 and 8201.

SYNPOL 8200 is an extremely light-colored polymer with *exceptional* resistance to discoloration and staining. *Exposure tests indicate it far outperforms its closest competitor.* Extended with 37.5 parts of an extremely light-colored, non-volatile naphthenic

with new light-colored SYNPOLS

oil, cold SYNPOL 8200 is glue-acid coagulated to reduce water-soluble content, and is particularly well suited for electrical and other low moisture absorption applications.

SYNPOL 8201, a light-colored, cold polymer containing 50 parts of naphthenic oil is specifically designed for *maximum economy* in light-colored rubber products. Like 8200, SYNPOL 8201 is glue-acid coagulated and contains a fatty acid emulsifier which enhances its cure rate.

Investigate the possibilities these two new styrene-butadiene rubbers offer you. For Technical Data Sheets on SYNPOLS 8200 and 8201, for information on a quality SBR for *any* product need, contact your TEXUS technical representative or write, wire, or phone the address below today.

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quality engineering puts efficiency into Shaw machines

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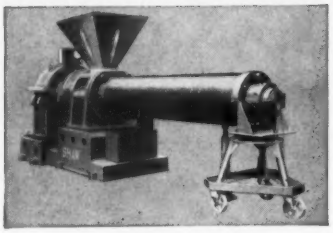
Close-limit accuracy and rigorous inspection during manufacture guarantee to the user a consistently high quality output from Francis Shaw equipment.



PLASTIC EXTRUDER Fine temperature control is a vital feature of Francis Shaw extruders. All electric heating in separate zones is provided, each zone being separately controlled by proportioning instruments. A wide range of screw and die designs is available for the production of piping, sheeting, sections and the sheathing and insulation of cables.
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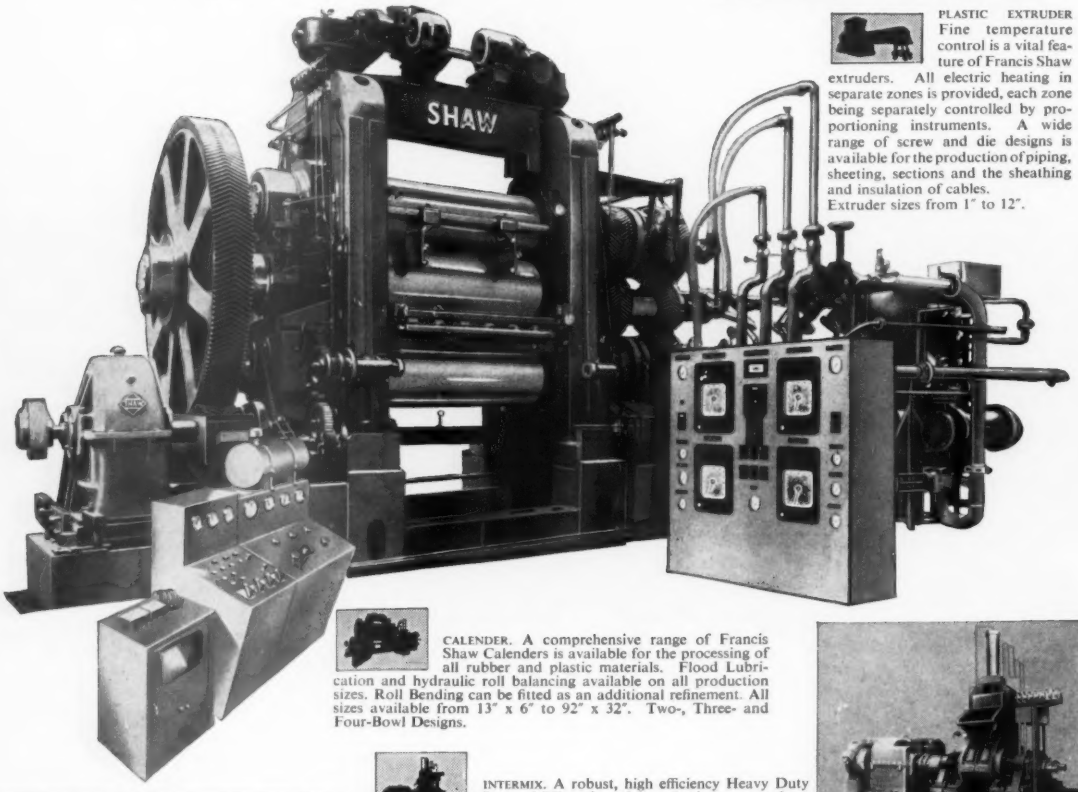
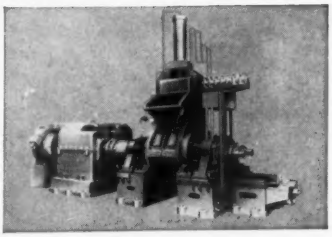


CALENDER. A comprehensive range of Francis Shaw Calenders is available for the processing of all rubber and plastic materials. Flood Lubrication and hydraulic roll balancing available on all production sizes. Roll Bending can be fitted as an additional refinement. All sizes available from 13″ x 6″ to 92″ x 32″. Two-, Three- and Four-Bowl Designs.



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P.1160

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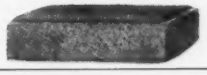
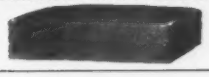
	NON-PIGMENTED 	PIGMENTED WITH PHILBLACK * 
HOT	PHILPRENE 1000 PHILPRENE 1009 PHILPRENE 1001 PHILPRENE 1018 PHILPRENE 1006 PHILPRENE 1019	
COLD	PHILPRENE 1500 PHILPRENE 1502 PHILPRENE 1503	PHILPRENE 1601 PHILPRENE 1603** PHILPRENE 1605 **Pigmented with EPC Black
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There are non-staining Philprene rubbers for makers of white wall tires, appliance door gaskets and window seals . . . light colored Philprenes for use in surgical goods and shoe soles. For top grade treads there are Philprene rubbers with tremendous abrasion resistance and long flex life. There are special Philprene polymers for the wire and cable industry . . . for nearly *everything* that's made of rubber.

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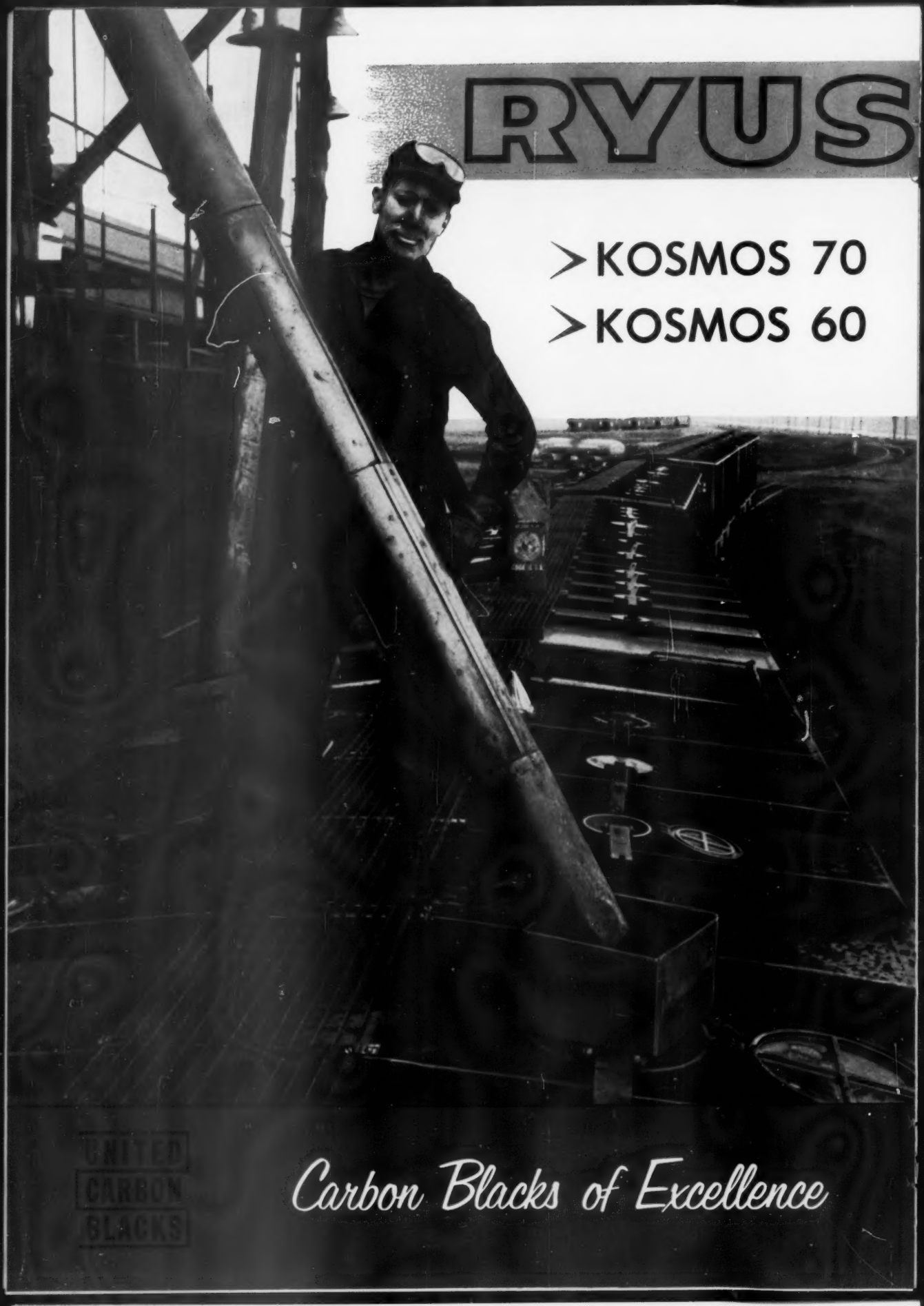
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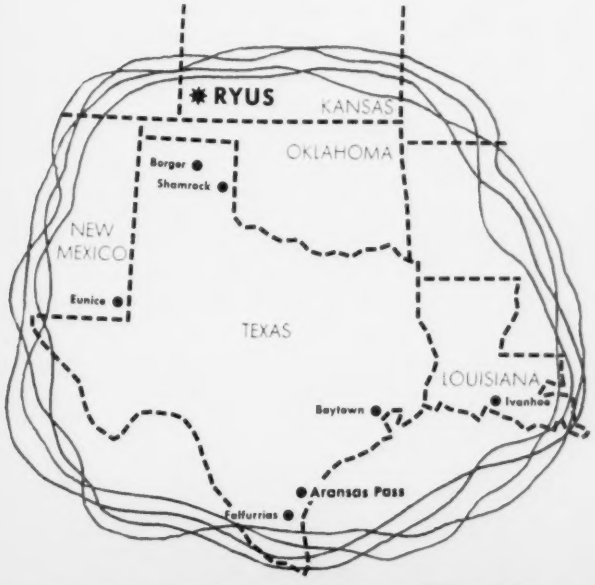

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coming events

Aug. 16-Sept. 6. International Union of Pure and Applied Chemistry, 17th International Congress and 20th Conference, Munich, Germany.

Aug. 30-Sept. 1. Chemical Institute of Canada, Physical Chemistry Subject Division, Symposium on "Mass Spectrometry in Chemistry", McMaster University, Hamilton, Ont., Canada.

Aug. 30-Sept. 3. Frankfurt International Fall Trade Fair, Frankfurt, Germany.

Sept. 2-4. 1959 Cryogenic Engineering Conference, University of California, Berkeley, Calif.

Sept. 7. International Exhibition of Industry and Commerce, Rio de Janeiro, Brazil.

Sept. 10-11. ASME Wood Industries Conference, Multnomah Hotel, Portland, Ore.

Sept. 10-11. Society of the Plastics Industry, Midwest Section Conference, French Lick Sheraton Hotel, French Lick, Ind.

Sept. 12. Connecticut Rubber Group, Summer Outing.

Sept. 12. Northern California Rubber Group, Summer Outing, Turtle Rock Ranch, Danville, Calif.

Sept. 13-18. American Chemical Society, 136th National Meeting, Atlantic City, N. J.

Sept. 13-17. National Tire Dealers & Retreaders Association, Annual Convention, Washington, D. C.

Sept. 21-25. 14th Annual Instrument-Automation Conference and Exhibit, International Amphitheatre, Chicago, Ill.

Sept. 22-Oct. 3. London World Trade Fair, Alexandra Palace, London, England.

Sept. 24. Fort Wayne Rubber & Plastics Group.

Sept. 24-25. American Society for Quality Control, Chemical Division, Annual Conference, Shamrock Hilton Hotel, Houston, Texas.

Sept. 27-30. American Institute of Chemical Engineers, St. Paul, Minn.

Sept. 28-30. American Oil Chemists' Society, Hotel Statler, Los Angeles, Calif.

Sept. 28-Oct. 2. 14th Annual National Hardware Show, New York Coliseum, New York, N. Y.

Oct. 1-2. Society of the Plastics Industry, 15th New England Section Conference, Wentworth - by - the - Sea, Portsmouth, N. H.

Oct. 2. Detroit Rubber and Plastics Group, Fall Meeting, Detroit Leland Hotel, Detroit, Mich.

Oct. 2. Philadelphia Rubber Group, Technical Meeting, Poor Richard Club, Philadelphia, Penna.

Oct. 6-9. Second International Symposium on "High Temperature Technology", sponsored by Stanford Research Institute, Asilomar, Calif.

Oct. 6. Los Angeles Rubber Group. Meeting sponsored by Plastic and Rubber Products Co., Biltmore Hotel, Los Angeles, Calif.

Oct. 7. Chemical-Finishing Conference sponsored by the National Cotton Council, Mayflower Hotel, Washington, D. C.

Oct. 8. Southern Ohio Rubber Group, Fall Technical Meeting, Gibbons Hotel, Dayton, Ohio.

Oct. 9-10. Southern Rubber Group, Technical Meeting, Hotel Peabody, Memphis, Tenn.

Oct. 11-16. American Society of Testing Materials, Third Pacific Area National Meeting, Sheraton-Palace Hotel, San Francisco, Calif.

Oct. 12-14. 8th National Clay Conferference, University of Oklahoma, Norman, Okla.

Oct. 12-20. "Machevo", Royal Netherlands Industries Fair, Utrecht, Netherlands.

Oct. 13. Buffalo Rubber Group, Fall Meeting, Hotel Westbrook, Buffalo, N. Y.

Oct. 13-14. Society of Plastics Engineers, National Technical Meeting, Ambassador Hotel, Los Angeles, Calif.

Oct. 16. Boston Rubber Group, Fall Meeting, Somerset Hotel, Boston, Mass.

Oct. 16. New York Rubber Group, Fall Meeting, Henry Hudson Hotel, New York, N. Y.

Oct. 17-25. "Kuneststoffe 1959," International Trade Fair of the Plastics Industry, Duesseldorf, West Germany.

Oct. 18-22. Electrochemical Society, Inc., Deshler-Hilton Hotel, Columbus, Ohio.

Oct. 19. International Symposium on Aging of Plastics, Sponsored by High Polymers Division of IUPAC, Duesseldorf, Germany.

Oct. 19-21. National Paint, Varnish & Lacquer Association, Annual Convention, Chalfonte - Haddon Hall, Atlantic City, N. J.

Oct. 19-23. 47th National Safety Congress and Exposition, Conrad Hilton Hotel, Chicago, Ill.

Oct. 20. Elastomer & Plastics Group, Northeastern Section, ACS.

Oct. 20-22. 10th National Conference on Standards, Sheraton-Cadillac Hotel, Detroit, Mich.

Oct. 21-25. 4th Annual Instrumentation and Automation Show and Conference, Palazzo del l'Arte al Parco, Milan, Italy.

Oct. 23. Akron Rubber Group, Sheraton Hotel, Akron, Ohio.

Oct. 26-31. International Organization for Standardization, Technical Committee 45, Henry Hudson Hotel, New York, N. Y.

Oct. 26-28. Ninth Canadian High Polymer Forum, Guild Inn, Toronto, Ont., Canada.

Nov. 3. Los Angeles Rubber Group, Biltmore Hotel, Los Angeles, Calif.

Nov. 5. Rhode Island Rubber Group, Fall Meeting, Pawtucket Country Club, Pawtucket, R. I.

Nov. 6. Connecticut Rubber Group, Sports Night.

Nov. 6. Philadelphia Rubber Group, Annual Dance.

Nov. 8-13. Joint International Meeting of Division of Rubber Chemistry, ACS; Committee D-11, ASTM, and Rubber and Plastics Division, ASME, Shoreham Hotel, Washington, D. C.

Nov. 8-10. Toy Production Show, New York Trade Show Building, New York, N. Y.

Nov. 16-20. Automation Show & Conference on Materials Handling, New York Trade Show Building, New York, N. Y.

Nov. 17. Elastomer & Plastics Group, Northeastern Section, ACS.

Nov. 29-Dec. 4. ASME Annual Meeting, Chalfonte-Haddon-Hall, Atlantic City, N. J.

Nov. 30-Dec. 4. 27th Exposition of Chemical Industries, New York Coliseum, New York, N. Y.

Dec. 3. Fort Wayne Rubber & Plastics Group.

Dec. 6-9. American Institute of Chemical Engineers, Annual Meeting, San Francisco, Calif.

Dec. 8. Buffalo Rubber Group, Christmas Party.

Dec. 11. Boston Rubber Group, Christmas Party, Somerset Hotel, Boston, Mass.

Dec. 11. Detroit Rubber and Plastics Group, Christmas Party, Hotel Statler, Detroit, Mich.

Dec. 11. Los Angeles Rubber Group, Christmas Party, Beverly Hilton Hotel, Beverly Hills, Calif.

Dec. 12. Southern Ohio Rubber Group, Winter Meeting.

Dec. 18. New York Rubber Group, Christmas Party.

MONSANTO RUBBER CHEMICALS ANSWER ANOTHER IMPORTANT COMPOUNDING

QUESTION:

What new sulfenamide accelerator gives me long delayed-action for greatest safety from scorch without sacrifice of speed at curing temperatures?

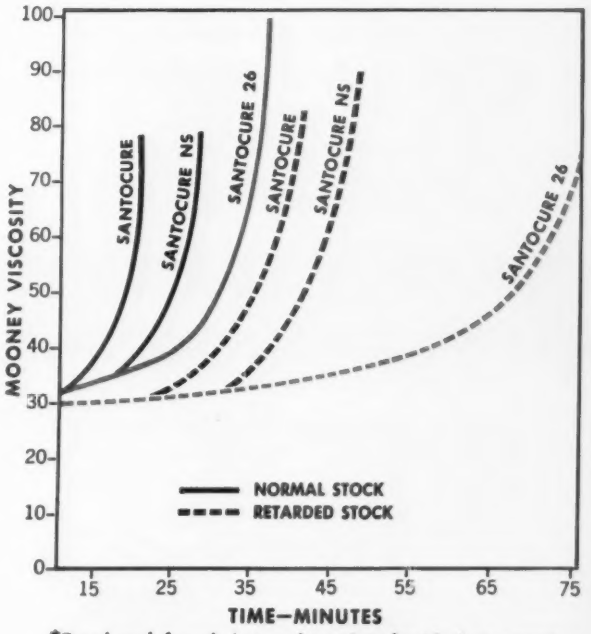
ANSWER:

New SANTOCURE 26

See how Monsanto's new SANTOCURE 26 compares with regular SANTOCURE and SANTOCURE NS—gives long delayed-action for greatest safety from scorch in a fast-curing natural rubber tread stock.* Now, with SANTOCURE 26, *you* can formulate around more extreme heat history without sacrifice of "mold-time" in *your* natural and synthetic rubber compounds.

Monsanto's family of sulfenamide accelerators give you the broadest range of controlled, delayed-action cures you can get. And SANTOCURE 26 protects *best* against premature curing of stocks from longer bin storage, higher processing temperatures, thicker sections, greater activation, prolonged time on the mill or calender and in the Banbury or extruder.

Storage and in-plant processing tests show that SANTOCURE 26 is the most stable sulfenamide accelerator you can use—gives day-to-day and season-to-season uniformity of cure. It responds to secondary accelerators and other compounding ingredients much the same as do other members of the SANTOCURE family. Try SANTOCURE 26 and see what it can do for scorchy stocks.



*Tread stock formulations and test data furnished on request.

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Jot it down on the nearest sheet of paper and send it in with your return address. No obligation—no salesman will call (unless you so request). To help you solve specific problems, Monsanto draws from basic knowledge of more than 85 rubber chemicals and over 18,000 compounding studies. Write, today.

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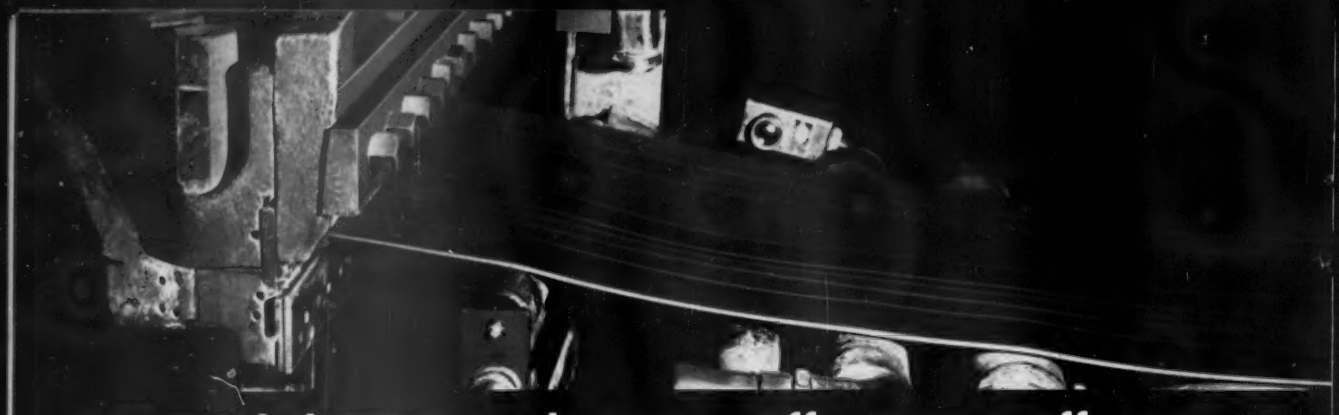
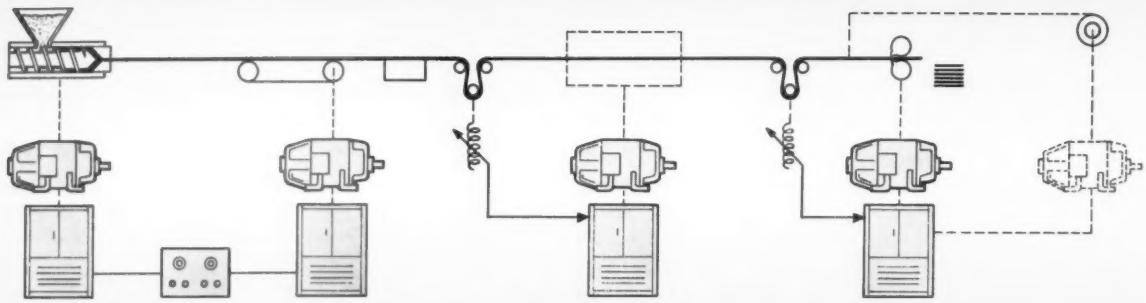
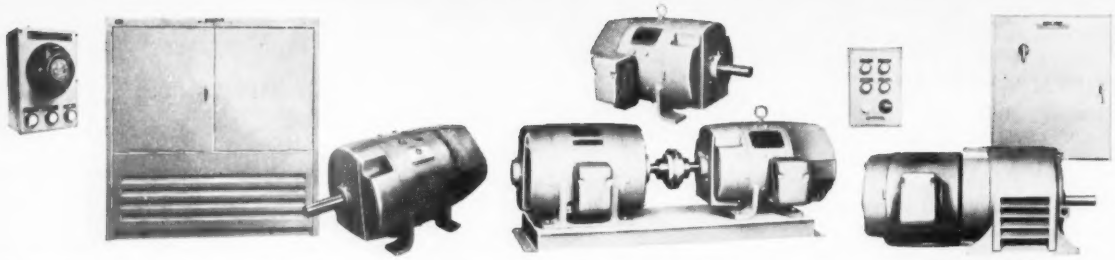


General Electric Extruder Drives Offer Greater Efficiency



At Payload Operating Speeds, Help Build Extruder Profits



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GENERAL ELECTRIC

As Soule Sees It...

by Kenneth J. Soule

SP Brown Crepe

The newest member of the SP (Superior Processing) natural rubber family is the brown crepe variety. For the many compounders who have previously had the unique pleasure of working with the earlier grades, (SP crepe or smoked sheet), the news of the availability of the less expensive brown crepe was indeed welcome. While for those chemists who for one reason or another have so far not tried out this remarkable type of crude rubber, may we suggest that now would be a good time to give yourselves a treat.

The basic technical details involved in the preparation of SP rubber, as well as the advantages to be expected from its use, have been well covered in bulletins issued by the producers, and in numerous articles in rubber journals in the United States and abroad. It is hardly necessary to repeat this data here, other than to emphasize that the most outstanding property secured by the use of any of the SP rubbers is improved processability. For example, the replacement of even a part of the usual natural rubber in a "pure gum" compound by SP rubber will almost magically improve the smoothness and speed of extrusions, cut down the die swell and very greatly reduce the collapse during cure of unsupported sections. Similar advantages obtain in calendered stocks. If this sounds too good to be true, join us ex-unbelievers and prove to yourself that the day of miracles is not over.

For general information, data sheets covering the various classes of SP rubber are now available, or to secure trial samples or production quantities of any of these rubbers, address the Natural Rubber Bureau, 1631 K St., N.W., Washington 6, D. C.

Evaporation

With evaporation, as with almost everything else in this complex world of ours, there are two diametrically opposed points of view possible when the subject is being considered.

On the one hand, in the "good old summer time," one of the really potent factors which often makes the difference between your merely tolerating, or really enjoying the weather, is the amount and speed of moisture evaporation from the surface of the body. This is equally true, whether you are using an old-fashioned palm leaf fan or a modern air conditioner as a "cooler-offer." Likewise, if you happen to be in the sugar refining industry, fast and thorough evaporation is vital to the concentration of the syrup, and the final production of crystalline sugar. In these instances, evaporation is a most desirable phenomenon.

Contrariwise, if you are in a business which involves the storage of large quantities of volatile hydrocarbons, loss of these liquids by evaporation presents a bothersome and costly problem. The petroleum industry for example, has always been obliged to struggle with this difficulty, and has tried many innovations to correct the trouble. One of the early set-ups involved a movable metal roof with the sealing member being a strip of fabric-inserted rubber packing which was fastened to the perimeter of the roof, hanging down like a curtain. This was moderately successful, although it was difficult to apply and maintain in place, and some of the solvent-resistant rubber of that period left something to be desired. Later on there were many variations of the original design, involving different fabrics, different coating materials, and different fastening or fabricating methods to improve the sealing area. None of the combinations tried were completely or uniformly successful.

In the last few years, one of the swings has been away from the floating roof idea. There has been a turn to the use of plastics in various shapes to form the complete seal. One of these involves the use of small nitrogen-filled spheres of phenol-formaldehyde, or similar resins, which float on the surface of the liquid in the storage tank to form a flexible covering.

In other installations, sheets or blankets of semi-rigid plastic replace the floating spheres. One of the more successful of these, which has found favor in Europe and Africa, is known as a "French blanket." It is quite elaborate in construction being formed from sheets of polyvinyl chloride which are zippered together and which are covered on the reverse side with a series of PVC floats fastened onto the sheet with a gasoline resistant adhesive.

In this country, blankets designed to serve the same purpose have been made of polyethylene in the form of heat-sealed pillows and expanded floats.

In spite of the multiplicity of types, styles, and designs of gadgets which have been dreamed up and tried out in service to cut down or eliminate these evaporation losses in storage tanks and the partially successful efforts attained by many of the installations, it appears quite obvious that the final and ultimate solution to the problem is still to be found. It may be that sprayed-on urethane foam has already been tried for this application, but if so, it has not come to my notice.

In any case, in view of the many other places where this sprayed-while-you-wait foam (either semi-rigid or flexible) appears to have filled a crying need, it might well be that this could turn out to be another spot where a do-it-yourself, on the job application of this versatile rubber would again ring the bell. If so the basic problem would promptly evaporate, while the precious liquids in the storage tank would stay put. And all concerned would be most happy. (Q.E.D.)

Tires — Here and There

Tires again continue to make news, in two widely separated fields. The more unusual of the two types of tires is the one developed by Goodyear Tire and Rubber Co. for use on space vehicles. No doubt remembering the fictional battle which was lost for want of a horse shoe, (and a horse shoe nail), this radically new wheel

As Soule Sees It (Cont'd)

and tire has been fabricated entirely of metal. It is designed to withstand the high temperatures encountered when planes, returning from outer space, pass through the thermal barrier as they re-enter the earth's atmosphere.

In these tires, the hub of the wheel appears to be made of two parallel metal plates bolted together with an air space between, with the tire body and tread consisting of a multiplicity of woven or twisted strands of wire extending outward from the rim of the wheel. In general appearance, the complete tire resembles an oversized circular buffing brush with the cut ends of the wires tightly bunched together to form the outer surface of the wheel. It is claimed that the tire will withstand temperatures in the range of 1000 to 2000°F.

The other tire is strictly conventional in appearance, and is designed for use on regular passenger cars. However, it is unconventional in one important respect, namely, that all of the rubber used in the tire—tread, carcass and sidewall—is butyl rubber. Heretofore, the chief use made of butyl, in the automotive field, has of course, been in inner tubes.

Now, after an unusually extensive and expensive period of development and testing, Esso Standard Oil Co. has begun to advertise and market their new tire under the Atlas Bucron label. The total cost of the evaluation and development is said to have been about $19 million, while the mileage covered during the road tests amounted to 300 million miles.

Esso advertising highlights the "no squeal" aspect of their tires, stating that it is impossible to make them screech, or even whimper on the sharpest turns—at any speed. However, other features will probably have a wider and more important customer appeal. These include the claims of improved stopping power—30 per cent better than any other tire—and the ability to stop faster on wet pavements than other tires do on dry roads. It is also alleged that the Bucron tires soak up the road shocks, producing a much smoother ride, and in addition do not age-crack or dry out and become brittle, as regular tires may sometimes do. Although Esso is quoted as saying that the new tire has 11 per cent greater durability (we presume they mean decreased tread wear) than competition, they are not emphasizing this point particularly, because the Bucron tires at present sell at about a 20 per cent premium. Thus, the "improved life," and the increased cost would be something of a stand-off.

If the Bucron tire catches the public favor as Esso is confidently expecting that it will, the next few years could easily see the United States consumption of butyl rubber double or even triple. Since the 1958 consumption was about 53,000 long tons and the present combined capacity of Esso and Humble is 109,000 long tons it is quite apparent that increased production facilities would soon be required. This presumably would not be an insuperable obstacle, since Esso has already licensed Petroleum Chemicals and Goodrich-Gulf to make the rubber.

The new tire, itself, may not do much squealing, but in any case, it seems certain that before the dust of many a touring season settles, certain parties are going to do a bit of moaning, or even maybe some screeching —either the competition, if it loses a large segment of its market; the customer, should the tire performance not live up to his expectations; or Esso, if some of a half dozen imponderables and unpredictables combine to throw a monkey-wrench into their elaborate promotion and production effort.

All things considered, it will be an intriguing passtime to try to predict the ultimate outcome, and then sit back and see how well history deals with your "guesstimates."

Sky-High Putty

The Thiokol Company's liquid polysulfide rubbers have been widely and successfully used for a number of years to solve all manner of sealing problems in the aircraft, shipping, electrical, building, construction, and allied industries. For this reason, it may seem a little like gilding the lily to call attention to one of the more recent skyscraper jobs in which a Thiokol liquid polymer was specified and is now in the process of being applied. The excuse—if one is needed—lies in the unusual size and prominence of the installation.

The building in question is the 52-story, glass and stainless steel curtain wall structure presently being erected for the Union Carbide Corp. on Park Avenue, New York City. It is due to be finished in 1960 and when completed, will be the tallest building on this famous street, as well as the highest finished in New York City since 1934. The material being used to seal the horizontal mullion joints is a liquid polysulfide specified by the Thiokol Chemical Corporation. Some idea of the immensity of the job can be gathered by the fact that over 5000 pounds of sealant rubber will be used on the joints of the 19 miles of stainless steel mullions.

Each joint is being carefully outlined by masking tape to insure a neat ship-shape seal. The sealant, applied by a regular caulking gun, is then smoothed down by means of a spatula. After the rubber has cured, the masking tape is carefully removed.

The selection of Thiokol's "rubber putty" for this important and impressive sealing job is a living testimonial to the host of other small and large successes which must have preceded it. It is silent tribute also, an unmarked monument, as it were, to the inventor of the various polysulfide polymers, Dr. J. C. Patrick and his co-workers. (P.S. If you are interested in more complete details of the above installation, including many excellent photographs, see ADHESIVES AGE, Vol. 2, No. 6.)

Down Under

Australia is reported to be considering a guayule "plantation," to boost their domestic rubber supply. This may be economically possible there, but have the native rabbits been taken into consideration? They already multiply faster than an IBM machine, and are almost disease-proof. Now if they eat guayule leaves and get rubber-re-enforced "innards," a completely resilient and indestructible tribe of bunnies may result. It so, good-by people!

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RESULT: The 100 pounds was delivered by Muehlstein at 4:30 P. M. the same day, sixty-two miles away. The customer made his deadline.

CHALLENGE No. 2: Mr. D. called for a 200 pound sample of rubber not currently in the Muehlstein warehouse. The customer needed it immediately.

RESULT: Material was procured from another of Muehlstein's warehouses and delivered more than 100 miles away at 9 o'clock the next morning. These are only two typical examples of the effort expended by the Muehlstein organization to render the proper services to our customers.

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• Schwarzinger & Co. Internationale Speditions, G. m. b. H., a freight forwarding firm of Vienna, Austria, has been denied all United States export privileges indefinitely for failing to answer questions concerning its handling of a neoprene synthetic rubber shipment of United States origin. According to the Bureau of Foreign Commerce, U. S. Department of Commerce, 30,000 pounds of neoprene valued at about $15,000, were shipped under general license from the United States last July for delivery to a consignee in Switzerland. The Bureau of Foreign Commerce said that it has reason to believe that the synthetic rubber did not remain in Switzerland, but was shipped to an unauthorized Soviet block destination.

Schwarzinger, although served with interrogatories and warned of the consequences if it did not answer them, has failed to reply concerning its role and that of others in the handling and ultimate disposition of the goods. The denial order issued by the Bureau of Foreign Commerce, dated May 29, will remain in effect until the Austrian firm either answers the Bureau's questions or gives a satisfactory reason for not doing so.

Under the order, Schwarzinger and any other person or firm with whom it may be associated in the conduct of trade, are prohibited from receiving, disposing, financing, forwarding, or otherwise participating in United States export, either directly or indirectly. The order further prohibits any act or service, concerning United States exports, from being performed for them by any person or firm.

• The government of Red China has ordered the introduction of the metric system. The law promulgated on June 25 concerns all measurements of length and weight. In certain cases, British measurements are still used because in recent years, Red China has imported quite a bit of machinery from the United Kingdom which, of course, is based on British measurements and standards. Some measurements of lengths, primarily the nautical mile, will still be used.

More and more countries turn to the decimal system and use metric measurements. Who would have thought 40 years ago that China with her complicated alphabet would ever be able to adopt the simple decimal system? If China, India and many other states can do it, when will the United States muster the will power and adopt the metric system also?

We believe that more scientists should start writing to their representatives and raise this very important issue. How about starting in a small way? For instance, when ordering thermometers, they should specify not only Fahrenheit but also Centigrade calibrations, thus reminding factories that the decimal measurements are used all over the world.

• According to the Russian publication *Kauchuk i Rezina (Rubber and Resins)*, fifty different types of tires for cars, agricultural machinery, motorcycles, etc. are manufactured in the Soviet Union at present. During the May Conference of the Central Committee of the KPSS, it was decided to double the output of the chemical industry by 1965 and to improve properties of the manufactured goods.

The output of large tires "Gigant", will constitute 70 per cent of the total output by 1965. Proposed output figures for various special tires are given. New tires with improved load and wear properties are to be manufactured and new wire designs are to be developed. There are also plans to improve the properties of synthetic rubber and viscose cords; for instance, sodium butadiene rubber will be substituted for isoprene rubber.

The quality of butadiene-styrene rubber is to be improved. Cords made of the polyamide fiber, Kapron, will be used in the tire industry, and the use of cords made of cotton fiber will be reduced from 52 to 20 per cent. There are also plans to use a wider variety of carbon black. Improvements in the method of retreading tires have been suggested. From 1959 to 1965, wear properties of tires will be increased by 33 to 45 per cent.

• The principle of Protected Reclaiming, as explained by A. Maurin, the french scientist, consists of treating vulcanized rubber, added to plasticizers, for three hours in an oven provided with an oxygen-free atmosphere. In order to eliminate crushing this material, a mechanical treatment which increases oxidation hazards, the author suggests substituting bits of tread submerged in an adequate solution for rubber powder. The final vulcanizate exhibits much higher properties than reclaim processed in an oxidizing atmosphere.

• The last Industrial Congress reviewed the advances and the outlook for the Russian rubber industry and stated that the following increases in pro-

duction have been made since 1955: in the synthetic rubber industry, 22 per cent; the tire industry, 36 per cent; and conveyor belts, 40 per cent. New tires such as tubeless tires and various special tires for agriculture and transport have been introduced. A new mechanized process for the assembly of tires has been developed and activated furnace black from liquid raw material has been manufactured in the Omsk carbon black factory. The manufacture of conveyor belts has been mechanized and the Institute of the Rubber Industry has started the mechanized production of molded articles and rubber tubes.

By 1965, output of the synthetic rubber industry will be 3.4 times higher than that of 1957. This will be accomplished by building new factories and reconstructing existing facilities. Rubbers such as isoprene, chloroprene, urethane, polysiloxane, nitrile, fluorine-containing, and butadiene-methylvinyl- pyridine, will be produced. Production will be 5.5 times higher.

The highly mechanized manufacture of tires will be investigated and new types of rubbers, cords and carbon blacks will be used in the tire industry. Manufacture of isoprene rubber and of urethanes and modified butyl rubbers will be speeded up. Properties of viscose cords will be improved and new types of cords from synthetic fibers such as Terylene, will be introduced. Further automation and mechanizadine, will be produced. Production will be 5.5 times interchange of experiences by various factories.

• Phoenix Gummiwerke A. G. plans to pay a 13 per cent dividend. This leading German rubber concern recently submitted, to the meeting of stockholders, its report covering 1958. Sales figures were not given and no correct analysis of the situation can be made. It is interesting to note that it takes a German factory more than one year and a half to submit a report about its past performance. Business in general was excellent, tire business increased, primarily in the passenger car field. Truck tire sales decreased a bit and in bicycle tires, a decided drop in sales was noted. However, imports from other countries in the European Common Market influenced sales of tires considerably.

Management complains about the ever-increasing competition caused by larger imports of various kinds of merchandise, primarily from the Far East. It was pointed out that canvas shoes have been imported on an increasing scale. In 1957, total imports amounted to 11 per cent of sales in Germany; Hong Kong contributed 35 per cent of the import figure. In 1958, the import of these canvas shoes was limited to 25 per cent of the German market. However, the imports from Hong Kong amounted to 56 per cent of the total import figure.

In view of continued liberalization of imports such as tires, rubber shoes and other merchandize made of rubber, which originate in countries with very low wages, Phoenix management is of the opinion that the German Republic should institute measures similar to those in the United States in order to protect the domestic industry. Of course, increased duties and limited imports are considered the best remedy.

• The writer recently returned from a five week trip through all of Germany. During most of the trip, very hot weather prevailed. Because many new drivers invade the Auto-Bahnen (German turnpikes), the German tire industry has started a public relations campaign in which advice is given about the correct air pressure. Almost every German daily paper has published various news items which primarily warn the driver to let air out after having driven for an hour or two on the Auto-Bahnen. It is pointed out that the increase of air pressure caused by friction and increased temperature is quite natural. As soon as the car stands still, air pressure in the tire will be reduced automatically.

This advice, which looks like grammar school information to any American driver, is necessary because the Germans are at present "driving-crazy". There is no speed limit on the Auto-Bahnen and one can see cars coming along at a speed of 80 and sometimes even 90 miles. It is no wonder that that there are so many accidents. Whenever the question of driving is discussed with Germans, they always point out that the Americans are the best and calmest drivers and they always admire the American troops who keep calm, drive cautiously, and don't use their horns when there is an obstacle on the road.

• Columbian Carbon Co. plans to build a $6,000,000 plant near Milan, Italy, with production facilities for more than 60,000,000 pounds of carbon black annually to supply the European Common Market area. The plant is scheduled to be completed by early 1960.

• The European Common Market has opened the door for French car manufacturers to export to Germany on a larger scale, in spite of the fact that the Volkswagen dominates German roads. The German Citroen Sales Agency has bought 22 acres of ground at Westhoven, a suburb of Cologne, in order to construct a warehouse for spare parts, a repair shop and management offices. The Agency visualizes a sales figure of 3000 units a year at the beginning and hopes to increase this figure considerably.

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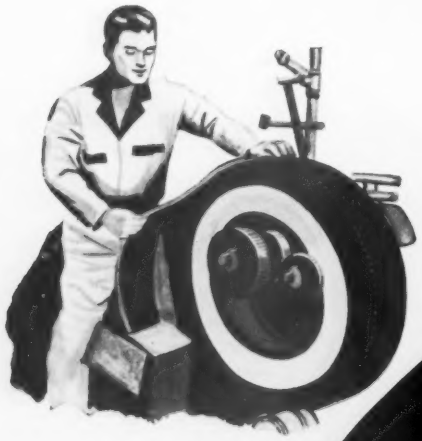

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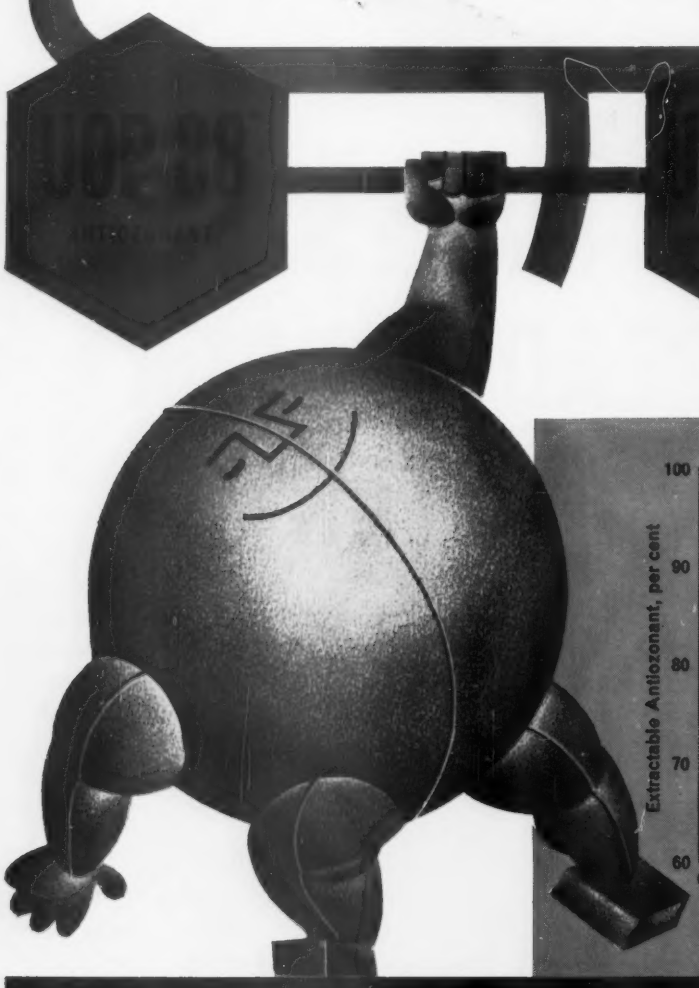
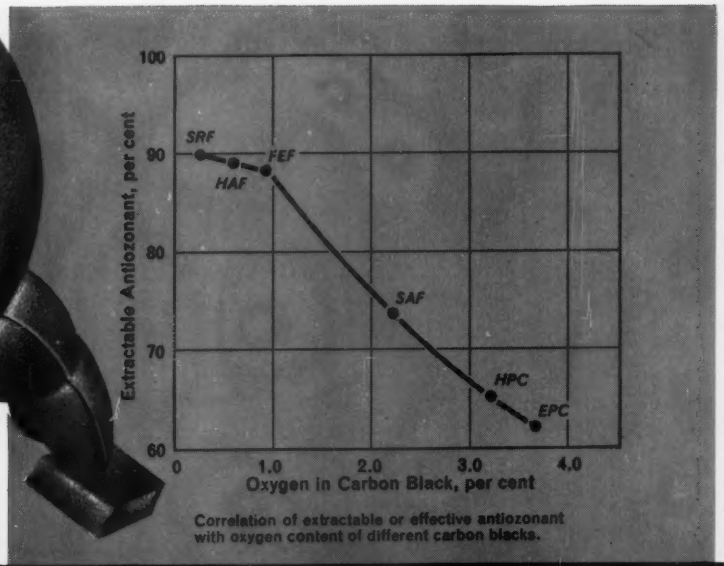
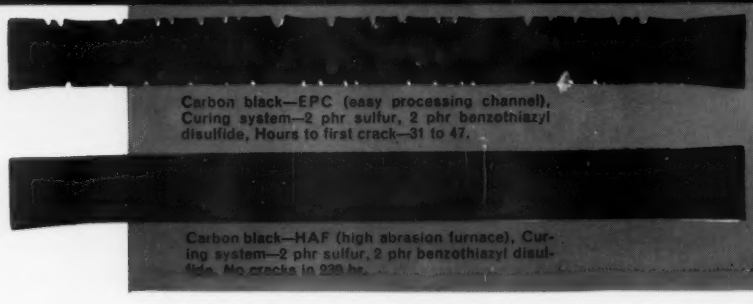
what type of CARBON BLACK helps fight ozone attack?





Correlation of extractable or effective antiozonant with oxygen content of different carbon blacks.

The SBR specimens at right were exposed to ozone at 100° F, 20 percent elongation, 52 hr. at 33 pphm ozone, then 187 hr. at 63 pphm ozone.



Carbon black—EPC (easy processing channel). Curing system—2 phr sulfur, 2 phr benzothiazyl disulfide. Hours to first crack—31 to 47.

Carbon black—HAF (high abrasion furnace). Curing system—2 phr sulfur, 2 phr benzothiazyl disulfide. No cracks in 239 hr.

the kind you choose can be a help or a hindrance . . .

Are you aware of the extent to which some carbon blacks adversely affect the protection afforded rubber products by antiozonants?

Some inactivate much of the antiozonant added for ozone protection. Others are more compatible with the antiozonant. How this affects the ozone resistance and hence the service life of rubber is well illustrated by the chart and table below. Even more dramatic than the figures presented is the difference in condition of the two rubber test strips shown at lower left.

Here is clear evidence that carbon black plays an extremely important part in obtaining maximum service life of rubber compounded with antiozonants.

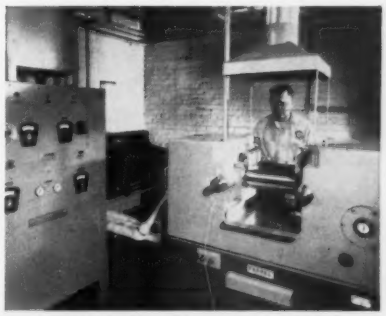
In formulating rubber compounds which must have high resistance to ozone, look to Universal for assistance. Special facilities and technical personnel are available to serve you. Write or telephone our Products Department.

CARBON BLACK TYPE AND ANTIOZONANT EFFECTIVENESS

Carbon Black	Approximate Areas, sq m per g	pH	Per Cent Oxygen in Black	Per Cent UOP 88 Extractable from Vulcanizate	Hours to First Crack of Vulcanizate 100 F—50 pphm Ozone		
					Elongations		
					25 Per Cent	20 Per Cent	15 Per Cent
None...	...	...	...	97.1	>336	>336	>336
MT.....	7	7.4	...	92.2	>336	>336	>336
FT.....	18	7.2	...	91.6	>336	>336	>336
SRF....	20	9.4	0.37	89.9	>336	>336	>336
HAF....	70	9.2	0.71	88.6	>336	>336	>336
FEF.....	40	9.3	0.97	87.9	>336	>336	>336
ISAF...	100	9.1	...	80.6	>336	>336	>336
SAF....	~140	...	2.21	74.5	>336	>336	>336
HPC...	~160	4.0	3.25	64.8	3	6	16
EPC...	110	4.3	3.71	61.9	2	2	6

The table above shows how carbon black type affects extractable antiozonant, which in turn affects ozone resistance of rubber. Note that rubber stocks containing a low percentage of oxygen show high extractable antiozonant, and consequent long life under conditions of high ozone concentration and stress.

To cover all phases of service conditions, UOP rubber labs conduct dynamic and static tests both indoors and outdoors:



To evaluate any service problem, test formulations are carefully compounded in this rubber mill by trained UOP technicians.

DeMattia flexer is used to evaluate flex-cracking properties of compounds tested in UOP rubber laboratory.

Test specimens mounted on outdoor racks are examined at regular intervals for evidence of deterioration.

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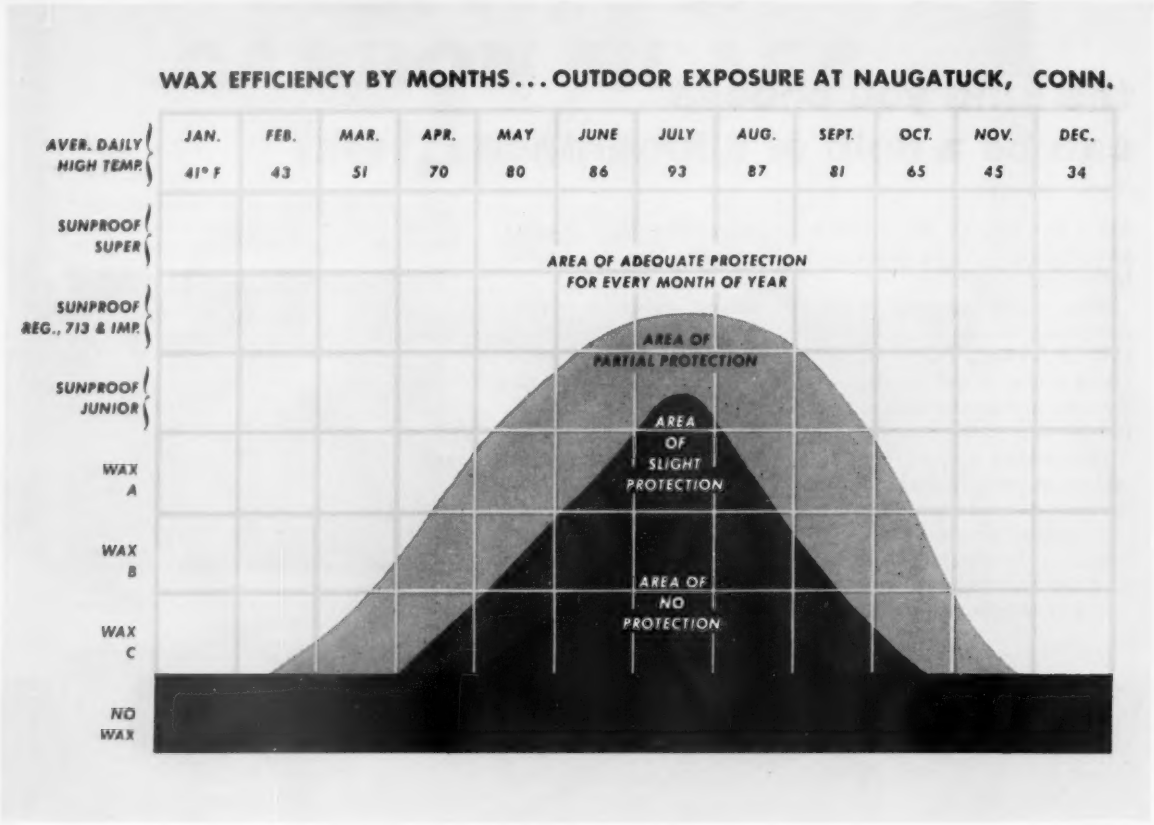
NAUGATUCK



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Most waxes used to inhibit static atmospheric cracking serve effectively only during part of the year. Some give adequate protection during the winter months, but are absolutely worthless during the summer. Others, very efficient during the summer, are least effective during the winter.

As the chart above shows, SUNPROOF® protects effectively *all year long*. Representing outdoor exposure tests of wax efficiency conducted at Naugatuck, Connecticut, and substantiated in Florida and Los Angeles, the chart clearly indicates the superiority of SUNPROOF blends of specially selected waxes over typical competitive products.

Combine SUNPROOF's *static* protection with antiozonants' *dynamic* protection to obtain all-around economical best results.

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RUBBER AGE/Vol. 85, No. 5/August, 1959

Constitution and Variability of Rubber from Individual Trees

By A. R. KEMP
Research Associate,
University of Southern California,
Los Angeles, California

ESTATE crude rubber is the result of blending latex from thousands of trees; therefore, it does not reflect variations in the rubber from individual trees. Rubber produced from young trees is likely to be softer than that from older ones. Hard tough varieties of rubber are the Up-River and Acre Fine Paras obtained for the most part from old trees. Other variables in commercial crude rubber in respect to composition, cleanliness, plasticity, curing, and aging properties are well known. Some of these variations are due to variables in collection methods and processing and the source of others have not been determined. Very little detailed study has been made of the rubber direct from individual trees. This situation is largely the result of the lack of suitable methods for such studies, and any result of such an investigation probably could not be related to variations in the bulked product.

The purpose of this paper is to present data on the variations in rubber from individual trees which was obtained by the use of special procedures designed to obtain pertinent information on several important variables under consideration.

This type of information is of aid in a better understanding of plant metabolism and synthesis about which little definite knowledge is available. Also in the selection of high yielding trees for bud grafting, added information regarding the nature of the rubber derived from individual trees could lead to the production of a superior type of estate rubber. The exact nature and variations in the soluble and difficultly soluble fractions in latex and crude rubber are still not fully understood, and the information in this paper is directed towards presenting more definite knowledge along this line.

In 1951, Bloomfield *(1)* published a series of papers giving results of a study of Malaya estate rubber from a few freshly tapped individual trees. The results of the present investigation will be closely compared with those obtained by this author. Bloomfield's investigation was directed mainly to variations in solubility, viscosity and molecular weight distribution of the sol hydrocarbon portion in the rubber from individual trees.

In order to compare the results on rubber direct from different trees with those from samples of crude rubber of commerce, Table I includes some data previously published by the writer *(2)* in this field, but presented here in a different manner. These data give the amount of sol and its intrinsic viscosity in various samples of crude rubber, using different solvents. The standard procedure used in this and the present work is to place 0.1 gram of a finely cut up sample into 100 ml. of solvent. A screw top bottle is employed which is immediately placed in a dark cabinet for six to seven days.

Following this period the swollen difficultly soluble gel is usually found intact and an aliquot of the clear solution can be pipetted out and its viscosity determined in a suitable viscosimeter at 20 or 25°C., followed by measuring the viscosity on less concentrated solutions of the same sol to obtain intrinsic viscosity data. In the case of the more soluble samples, a loose

Note: This paper was presented before the Division of Rubber Chemistry, ACS, at Los Angeles, Calif., May 15, 1959.

A. R. KEMP, well known consulting chemist who has specialized in all phases of rubber research, compounding and manufacture, has dealt with rubber technology since 1918 when he joined the section of Western Electric Co. which was later to become Bell Telephone Laboratories. Retiring from this position in 1948, he has since been engaged in a private consultation practice and also has been associated with several organizations, including the U. S. Army, Department of Defense, and Narmco Resins and Coating Co., in various research and directorial capacities. At the present time he is a research associate at the University of Southern California. Mr. Kemp received the B.S. degree in chemistry from the California Institute of Technology in 1917, where he was granted a teaching fellowship for graduate work leading to the M.S. degree in 1918. Mr. Kemp is the author of 49 published works in various technical journals dealing with various research projects in the fields of rubber and plastics technology, and is the holder of 38 U. S. and approximately 300 foreign patents covering manufacturing methods and materials.

flaky gel is found and filtration must be resorted to. In this case, the solution is filtered through a very open filter paper in a closed system to avoid loss of solvent. An aliquot is removed to determine the amount of rubber in solution by removal of the solvent in an evaporating dish which is warmed while a stream of carbon dioxide is passed over it.

The results in Table I show that smoked sheets and crepe give about the same results in benzene and chloroform which the writer considers to be the most suitable solvents for this work. The crepe has a higher purity, but is milled more during washing. These are offsetting factors affecting solubility and viscosity. Samples of rubber under test should not be exhaustively dried when benzene is used for this work as it has been shown *(2)* that this results in a large decrease in solubility and viscosity. Chloroform is a somewhat faster acting solvent than benzene. It contains a small quantity of alcohol for stabilization and drying the rubber does not affect the results obtained with it. For this reason chloroform is preferred over benzene.

Rubber from Florida

From the period 1939 to 1943 the writer conducted studies on rubber from the various species of trees and plants at the U. S. Department of Agriculture Plant Introduction Garden at Chapman Field, Miami, Florida. The rubber trees there were raised from seed and were about 10 years of age *(3)*. The growth of these trees was slow and their yield of latex low, reflecting the unsuitable climatic conditions for rubber culture. However, the larger and older of these trees were healthy and yielded latex which appeared fairly close to normal. The results obtained in this study were not published because it was felt they might not truly reflect those that would be obtained from healthy trees in the producing areas and therefore be misleading.

In connection with the writer's studies in Florida a satisfactory method was developed for sampling and preserving rubber taken directly from a tree which permits many variables to be studied. It consists in allowing a few ml. of the latex from a fresh tapping cut to flow into about 50 ml. of 95 per cent or absolute ethyl alcohol. This procedure results in immediate and complete coagulation of the rubber and kills all bacteria present in the latex. One can also note the color and hardness of the coagulum, the nature of the serum and amount of non-rubber constituents separating from the serum on standing. The rubber which is immersed in the alcoholic serum is very stable and conditions are ideal to resist aging and changes in any of the constituents. Some of the proteins will precipitate from the serum. The samples are best preserved over long periods in an ice box at about 40°F. and under this condition the writer has found changes are practically nil over long periods of a year or more.

In Table II data are presented on rubber samples collected as described above from different species of trees as well as from Cryptostegia Hybrid. It is seen that with the exception of the Manihot sample, all rubbers from Florida were completely soluble. The Hevea samples were somewhat soft compared with No. 1 Crepe and this is reflected in their lower vis-

TABLE I—SOLUBILITY AND VISCOSITY OF RUBBER IN VARIOUS SOLVENTS*

Rubber Type	Solvent Used	Solubility %	Intrinsic Viscosity
No. 1 Smoked Sheets	Chloroform	85.0	6.39
	Benzene	81.5	6.81
	Carbon tetrachloride	79.0	6.81
	Cyclohexane	67.7	7.50
RCMA Crepe	Chloroform	86.0	6.51
Thick Crepe**	Chloroform	85.0	6.45
	Benzene	74.7	6.65
	Chlorobenzene	83.5	6.72
Bolivian Fine Para	Chloroform	61.6	7.84
	Benzene	51.0	7.62
Commercial Latex Film	Chloroform	62.3	7.00
	Hexane	6.4	1.42
Commercial Latex Film, Washed	Chloroform	66.6	8.46
	Hexane	9.7	3.13
Commercial Latex Acid, Coagulated	Chloroform	56.8	8.10
	Hexane	5.6	1.70

*Data, except for thick crepe, taken from article by Kemp and Peters, all samples air dried [*Ind. Eng. Chem., Vol.* 33, p. 1391 (1941); *Rubber Chem. Tech.*, Vol. 15, p. 1 (1942)]. **Crepe after keeping eight years in dark at room temperature.

TABLE II—SOLUBILITY AND SOL VISCOSITY IN CHLOROFORM OF FLORIDA RUBBER*

Rubber Species	Solubility %	Intrinsic Viscosity
Hevea Tree 1533	100	5.04
Hevea Tree 517 (1st tap)	100	5.84
Hevea Tree 517 (2nd tap)	100	5.82
Hevea Tree 514	100	5.61
Manihot Glaziovii	88	3.13
Funtumia	100	7.47
Cryptostegia Hybrid	100	6.90
Hevea Tree 1533 (Latex dried in vacuum)	100	4.90
Hevea Tree 514 (Latex dried in vacuum)	100	6.23

*Alcohol coagulum pressed free of serum, cut fine and air dried in dark.

cosities and freedom from any insoluble fraction. Funtumia, a hard tough rubber, is recognized as a high grade type and it differs mainly from Hevea in its somewhat higher content of resins. It does not respond to acid coagulation but alcohol coagulates it immediately. The high viscosity of its sol is evidence of the high average molecular weight of its hydrocarbon compared with Hevea grown under the same adverse Florida climate for rubber culture.

Cryptostegia Hybrid rubber is grown in Florida under favorable conditions and it is completely soluble with a high intrinsic viscosity equal to the best grades of estate rubber. Johnson *(4)* found a sample of this type of rubber to be only partly soluble in toluene which may have been due to some aging effect after collecting.

Rubber from Costa Rica

Through the courtesy of the Goodyear Tire and Rubber Co., the writer was permitted to visit its Speedway Estate located at LaFrancia on the eastern slope of Costa Rica about 90 miles southeast of San Jose. The trees in this 1500-acre estate were planted from seedlings about 16 years ago. The annual rainfall in the area averages about 150 inches and cloudy weather is more frequent than in the better rubber producing areas. This has led to some infection by the dreaded leaf fungus disease. All trees were being regularly tapped and the tapping system used was full spiral every four days.

An area where the trees were uniform and quite normal and healthy was selected for taking the samples, and 24 trees located adjacent to one another were tapped into separate containers containing alcohol. These trees bunched close together were selected in order to study differences between individual trees rather than other factors. The trees were tapped and in a few minutes, when the latex was running freely into the cup, a few ml. were allowed to drip directly into the alcohol which brought instant coagulation. When one or two grams of rubber were collected from each tree, the writer proceeded immediately to the next tree, taking less than one hour to collect all 24 samples.

Tapping a rubber tree at the Speedway Estate located at LaFrancia on the eastern slope of Costa Rica.

A bulk sample from ten trees nearby was collected after flow had stopped and this rubber was immediately coagulated by adding an excess of alcohol. A sample of the bulked estate latex collected for the day was taken before dilution and addition of sulfite and this latex was also coagulated with alcohol. Also a sample of acid coagulum from the bulked estate latex of the same day's production was soaked in alcohol and squeezed as free as possible of serum. A sample of regular production crepe was taken from the dryer for comparison and this appeared to be high grade and normal in every respect.

Table III presents the data on the latex from individual trees and Table IV on the bulked samples compared with crepe. It is seen from Table III that very large differences occur in rubber from different trees. As far as the author is aware, mottled grey rubber has not previously been reported. This grey color was not evident in the latex samples from trees 9, 15, 22 and 23 which appeared normal on tapping. The grey mottled appearance results from the presence of clotted lutoids in the latex *(5, 6)*. The color of the rubber between the grey blotches was a normal cream color. Rubber from trees 14, 16, and 24 was practically white, while aside from the grey samples, the remainder ranged from light to deep cream or yellow color. The solubilities in chloroform showed a wide range from 61 to 98 per cent while the intrinsic viscosities ranged from 5.14 to 8.44. In cases where the solubility was high and the viscosity low, the rubber was soft.

Chloroform as the Solvent

It was previously shown *(2)* that exhaustive drying of crude rubber greatly reduces its solubility in benzene but has practically no effect on solubility in chloroform, which the writer finds to be the best and most powerful solvent for rubber. This fact cannot be stressed too highly as benezene has been the most widely used solvent in research work on rubber. This effect is apparently connected with the gel or difficultly soluble portion, and those samples of rubber having the highest gel content are the ones which show

A grove of Hevea in Florida as it was during the author's studies some years ago.

the greatest effect of drying on their solubility in benzene.

In order to show the effect of drying on the solubility in various solvents a sample of coagulum from tree No. 17 was dried exhaustively for one week. The results given in Table V show this effect in striking fashion.

When crude rubber is dried in air at ordinary temperatures it shows about the same solubility in benzene, toluene and chlorobenzene and a somewhat lower solubility in cyclohexane and carbon tetrachloride as compared to chloroform *(2)*. It is seen in Table V that chloroform is the only solvent in which the solubility of rubber with a high gel content is unaffected by exhaustive drying.

Rubber deteriorates rapidly in chlorobenzene and carbon tetrachloride, especially when exposed to light for very short periods; therefore, these solvents should be avoided.

It was found during work in Florida that rubber latex when spread thin on a glass plate and dried quickly under a vacuum dessicator will redisperse almost completely when placed in water. When the film is heated an hour at 50°C., it slowly sets up, but when the temperature is raised to 80°C. it no longer disperses. In a similar manner, the freshly tapped and dried film will disperse almost completely when immersed in petroleum ether and shaken, but after heating at 80°C. then only about 40 per cent dissolves and the difficultly soluble portion is swollen into a coherent gel.

Bloomfield *(1)* tapped about one ml. of the latex directly into 100 ml. of benzene and after shaking, the dispersion was complete. After removing the water under reduced pressure at 30° to 35°C., the solution was filtered and its viscosity and concentration were then measured and reported as latex solution voscosity or L.S.V. values. These L.S.V. values expressed as intrinsic viscosity ranged from 4.80 to 7.20 for seven trees with the average equal to 5.80.

Another of Bloomfield's procedures was to add to the dry latex solution in benzene an equal volume of

TABLE III—SOLUBILITY AND SOL VISCOSITY OF RUBBER* FROM INDIVIDUAL TREES IN COSTA RICA

		Solubility %		Intrinsic Viscosity		
Tree No.	Color	Chloroform	Benzene	Chloroform	Benezene	Firmness
1	Light Cream	80	80	5.87	5.77	Normal
2	Cream	90	86	6.65	6.52	Normal
3	Light Cream	67	67	7.01	6.83	Hard
4	Light Cream	61	60	6.71	6.51	Hard
5	Light Cream	96	94	5.40	5.06	Soft
6	Light Cream	89	—	6.35	—	Normal
7	Light Cream	65	—	8.21	—	Hard
8	Light Cream	80	—	7.36	—	Normal
9	Grey, Mottled	81	—	7.29	—	Normal
10	Light Cream	65	67	6.51	5.86	Hard
11	Cream	77	76	8.44	8.14	Hard
12	Light Cream	84	—	5.63	—	Soft
13	Light Cream	81	—	5.75	—	Soft
14	White	62	—	7.37	—	Hard
15	Grey, Mottled	92	—	5.52	—	Soft
16	White	84	—	5.45	—	Soft
17	Yellow	67	—	7.36	—	Hard
18	Light Cream	76	—	7.02	—	Hard
19	Light Cream	90	—	6.03	—	Normal
20	Light Cream	95	—	5.80	—	Soft
21	Cream	98	—	5.93	—	Soft
22	Grey, Mottled	92	—	5.98	—	Soft
23	Grey, Mottled	86	—	5.14	—	Soft
24	White	95	—	6.88	—	Normal, long fibered

*Alcohol coagulum pressed, cut fine and air dried in dark.

a mixture of 70/30 methyl alcohol/benzene. This precipitates out most of the rubber hydrocarbon in a fairly pure form removing a considerable part of the non-rubber constituents. This partially purified rubber was then placed in benzene, and in a case of latex from two trees, there remained 20 per cent insoluble gel in one and 41 per cent in the other. The sol components of each had a higher intrinsic viscosity than the whole rubber in benzene. In the case of rubber from the same seven individual trees mentioned above, the sol viscosities of the purified rubber ranged from 6.50 to 9.18 with the average being 7.58, which is about 30 per cent higher than for the whole rubber in the L.S.V. measurements of the same trees.

It must be pointed out that the difficultly soluble fraction present in the whole rubber contributes very little to viscosity since very little of it is dispersed as is the sol fraction. The insoluble fraction probably is present in the benzene as highly swollen finely dispersed gel particles and as such contribute little to the viscosity, as was pointed out recently by Freeman *(7)*. In addition, the soluble non-rubber constituents present in the L.S.V. measurements reduce the viscosity practically in proportion to their content which Bloomfield estimates at about 10 per cent. If we take the average insoluble fraction content of 20 per cent found by the writer in Costa Rica latex and add the 10 per cent non-rubbers, the increase of the viscosity of the sol in the purified rubber of 30 per cent over the L.S.V. values can be fully accounted for.

It is seen in Table IV that the range of sol intrinsic viscosity for the alcohol coagulated rubber from latex taken from 24 different trees is 5.14 to 8.44, and these results are close to those found by Bloomfield for purified rubber. The alcohol coagulated product still contains a substantial portion of the non-rubbers which accounts for their being on the average about 15 per cent lower. Some of the lowest molecular weight hydrocarbons may also have been removed by Bloomfield's purification method.

On the whole, the agreement between the two investigators is very good. The large number of trees studied by the writer must also be considered in the comparisons made above, although even in the case of 24 trees, this is only a very small sampling to obtain an insight into the full spread of the variables involved in rubber produced by individual trees. It is truly remarkable that such wide differences were found in the case of only 24 trees of the same age growing adjacent to one another and tapped at the same time. This illustrates that the method of alcohol coagulation is one which is well suited for such a study. A much broader study using this method should yield very valuable information for rubber producers since some individual trees produce superior rubber in respect to color, texture, solubility and viscosity. A broad study of these and other factors together with yield should enable one to select the superior trees which could be used in bud grafting to build up an estate which would produce a higher quality and more uniform product.

Van Essen *(8)* published results on the vistex viscosity resulting from tapping 34 individual trees in Indonesia into a mixture of 70 volumes of toluene and 30 of pyridine. Values ranging from 3.52 to 7.10 with an average of 5.0 were obtained. Such vistex values are considerably lower than those obtained on the same latex rubber in chloroform, but these results do show the wide variations in rubber from different trees. That individual rubber trees show these differences probably is related to their heredity. The original seeds brought out of South America no doubt produced trees which differed in certain respects and may even have involved a mixture of species. It is known that no two rubber seeds from different rubber trees have the same marking, which is evidence that each tree is an individual. Using the methods of the present study, it would be of interest to extend the investigation making a more extensive study of different species of Hevea in their native locations along with many other important variables.

TABLE IV—COMPARISON OF SOLUBILITY AND VISCOSITY IN CHLOROFORM OF INDIVIDUAL TREE SAMPLES WITH BULKED SAMPLES AND CREPE

Description of Sample	Solubility %	Intrinsic Viscosity
Range of 24 Individual Trees	61–98	5.14–8.44
Average of 24 Individual Trees	80	6.42
Costa Rica Regular Crepe	86	6.46
RCMA Crepe	86	6.51
Thick Crepe	85	6.45
Bulked Alcohol Coagulated Latex from 10 Trees, No Ammonia Added	80	6.95
Regular Alcohol Coagulated Costa Rica Bulked Field Latex on Arrival	76	6.95
Regular Factory Diluted and Acid Coagulated Costa Rica Field Latex*	78	7.36

*Considerable maturation occurred during two weeks before sample was tested.

Effect of Age of Tree

Bloomfield *(1)* found that rubber from older trees which had not been tapped for 8 to 20 years was much harder and less soluble in benzene than rubber from regular tapping. He estimated the so-called gel content in this rubber by determining the amount of rubber remaining undissolved in a mixture of 80 volumes of benzene and 20 volumes of methyl alcohol after three days at 30°C. This undissolved portion ranged from 85 per cent at the first tapping and dropped to 66 per cent at the twenty-fifth tapping. Data were presented on the so-called gel content of the six trees reported on and these ranged from 51 to 88 per cent. It should be pointed out that a large proportion of this so-called gel fraction is soluble in benzene or chloroform since only the lower molecular weight portion of the rubber is soluble in an 80/20 mixture of benzene and methyl alcohol as will be

TABLE V — EFFECT OF EXHAUSTIVE DRYING* ON SOLUBILITY AND VISCOSITY OF SAMPLE NO. 17 IN VARIOUS SOLVENTS

Solvent	Solubility	Intrinsic Viscosity
Chloroform	66	7.40
Chloroform**	67	7.81
Benzene	57	6.44
Benzene***	45	6.90
Toluene	54	6.81
M-Xylene	68	5.15
Carbon Tetrachloride	26	4.96
Chlorobenzene	62	4.90
Cyclohexane	21	3.98

*Alcohol coagulum from tree 17 pressed, cut fine and dried in vacuum dessicator one week (0.1 gm. in 100 ml. solvent for seven days); **In solvent ten days; ***Sample dried five weeks in dessicator.

shown later in Tables VI, VII and VIII. This method of test is therefore not a good procedure to show the differences between old untapped trees and regularly tapped ones. There is, however, other good evidence to indicate that the older trees do produce a harder rubber. This variable should be explored further by using the methods used in the present investigation.

An investigation of the solubility of fresh latex in petroleum ether was carried out by Verbrugh *(9)* in Java in 1941 and he found that when the latex was collected and dried without exposure to air or light, the maximum amount of rubber soluble in petroleum ether was 66 per cent. The swollen gel, however, was loose and flaky and would disperse on gentle agitation. These results confirm those obtained by the writer in Florida. The maximum solubility found by the writer *(10)* for acetone-extracted Java crepe in mixed hexanes (Skellysolve B) after exhaustive treatment for long periods with several solvent changes was 53 per cent. The higher value found by Verbrugh was probably due to the presence of the resins and other petroleum ether soluble non-rubber constituents not present in crepe rubber.

Bloomfield *(1)* determined the insoluble fraction which he termed microgel after petroleum ether extraction on thin films of latex dried in nitrogen, the latex being taken from seven individual trees. The soluble fractions ranged from 33 to 79 per cent, the average being 55 per cent. The value for normal bulked latex was 52 per cent.

In view of these data it is seen that the sol fraction in fresh latex rubber is about the same as in crepe, but the insoluble swollen gel is of a loose structure which can be more readily dispersed. Upon drying or heating and standing as in the manufacture of crepe and smoked sheet, the difficultly soluble or gel fraction present in the original latex is much firmer and swells less in solvents.

It must be noted that the insoluble residue or gel from petroleum ether or hexane extraction is larger in quantity and not to be confused with the residual undissolved gel from benzene or chloroform extraction, since hexane or petroleum ether will not dissolve the higher molecular weight fractions due to their limited solubility in these solvents. In crepe rubber about 50 per cent is soluble in hexane while for the same rubber 80 to 85 per cent is soluble in chloroform or benzene.

In the case of a sample of alcohol coagulated Costa Rica latex solubility in benzene was 81.0 per cent and intrinsic viscosity of the sol was 6.74. In hexane under the same conditions the solubility was 40.5 per cent and intrinsic viscosity 4.88. This shows that hexane which is similar to petroleum ether in solvent power fails to dissolve the higher molecular weight fraction in rubber. The undissolved residue from petroleum ether or hexane is a highly swollen gel, but it is quite different from the residue from chloroform or benzene extraction.

Fractionation of Fresh Latex Rubber

Crude rubber has been proven to consist of a series of soluble polymer fractions varying quite broadly in molecular weight and a gel which is difficultly soluble in solvents such as benzene or chloroform, varying in quantity usually in the range of 10 to 25 per cent for crepe or smoked sheet up to about 35 per cent in the case of latex and wild rubber. These values are based on using benzene or chloroform and 0.1 gram of finely cut up rubber in 100 ml. of solvent and standing in the dark for 6 to 10 days to allow the sol fraction to dissolve without shaking.

The writer *(10)* carried out a fractionation of acetone extracted crepe rubber using 5 grams of finely cut rubber in 250 ml. of mixed hexanes (Skellysolve B). The solution was decanted from the swollen gel eleven separate times and replaced with fresh solvent and the periods of each treatment varied from one hour to 48 days. The first one-hour fraction dissolved was 4.4 per cent with an intrinsic viscosity of 2.66, and each fraction showed an increase in viscosity until the ninth fraction was reached and 46 per cent of the sol had been extracted. At this point, the solubility of the residual rubber reached a constancy of 0.1 per cent and the intrinsic viscosity of the remaining four fractions remained practically constant, ranging from 7.13 to 7.54. Although the last fractions were very narrow, the first ones were not, since their solubility in hexane is high, a wide range of molecular weights would be expected. This work pointed up the fact that the higher molecular weight fractions do have a very limited solubility and require long periods to saturate the solvent by diffusion.

Bloomfield *(1)* carried out fractionation of rubber latex from different trees tapped directly into benzene in Malaya by adding 30 per cent methyl alcohol to it while warm until incipient precipitation started then cooling in various stages. Insoluble fractions in benzene of 14 to 23 per cent first precipitated and several other fractions totaling 70 to 80 per cent were thrown out of the solution at reduced temperatures having inherent viscosities of 1.3 to 11.5 in alcohol-free benzene.

In order to study the full scale of molecular sizes

TABLE VI — FRACTIONATION OF COMPOSITE FROM TREES 1 THROUGH 5

Fraction No.	Solvent Benzene-Alcohol	Time Days	Extract Per Cent	Intrinsic Viscosity Chloroform	Nature of Extract
1	200 ml. 40-60	2	2.00	—	Resin
2	200 ml. 50-50	2	0.33	—	Resin
3	220 ml. 59-41	3	0.70	0.10	Soft, sticky yellow
4	233 ml. 70-30	4	0.96	0.55	Soft, sticky, pasty yellow
5	100 ml. 72-28	3	0.53	0.47	Soft, sticky, pasty yellow
6	100 ml. 77.5-22.5	3	2.01	0.55	Firm, pasty, slightly elastic
7	100 ml. 77.5-22.5	4	4.00	1.08*	Soft rubber, slightly elastic
8	100 ml. 80-20	2	6.60	1.89**	Soft rubber, slightly elastic
9	425 ml. Benzene	7	57.00	9.90	Tough elastic colorless
10	———	7	25.87	—	Residual gel

*(η) in Skellysolve B 0.65 — N-Heptane 0.63; **(η) toluene 1.77, and in cyclohexane 1.87.

in rubber direct from the tree, the writer carried out two separate fractionations. In one fractionation, a composite of alcohol coagulated samples numbers 1 to 5 inclusive was used, and in the other, the rubber involved a mixture of samples numbers 7, 14 and 17. The first series were more or less normal with average viscosity while 7, 14 and 17 were all hard with high sol viscosity and high contents of the difficultly soluble fraction ordinarily called gel.

The samples were cut fine and 1.5 grams in the case of the 1 to 5 blend were placed in benzene methyl alcohol mixtures in a dark cabinet starting with low benzene ratios and increasing with different fractions. Each fraction was the result of extraction by diffusion after several days standing in the dark. The amount extracted was determined by decanting the solution from the gel evaporating a measured volume of solution, evaporating to dryness in a stream of CO_2 and weighing the residue. The viscosity of the fraction was determined when dissolved in benzene or chloroform. The viscosities of some fractions were determined in several solvents for comparison. In the case of the 1 to 5 blend after the lower fractions were removed, the remaining rubber was treated with 425 ml. of benzene and a large fraction removed leaving the the swollen gel residue.

In the case of blend 7, 14 and 17, a somewhat different procedure was followed, using 2.5 grams in 100 ml. of solvent sample and carrying out a more detailed and exhaustive fractionation. Carbon dioxide was kept over the solvents at all times and the flasks kept in a dark cabinet at room temperature 20° to 30° C.

The results in Tables VI and VII show the wide distribution of molecular sizes of the rubber fractions which can be shown to be present in rubber direct from the tree. The lower members are more clearly separated by the diffusion procedure than was the case in Bloomfield's investigation *(1)* using precipitation which placed emphasis on the higher members. Dropping the alcohol concentration from 80/20 to 82/18, a critical point is passed at which the solvent mixture becomes an excellent solvent for the higher members.

About 8 per cent of the rubber has an intrinsic viscosity ranging up to 1.0 and about 7 per cent from values of 1.0 to 2.0. From this point the fractions showed a rapid rise in viscosity to a maximum of 9.9.

In order to compare the regular Costa Rica crepe rubber with the product coagulated with alcohol from the latex of individual trees, a fractionation was made of the regular crepe which was a result of mixing the latex from about 50,000 trees in the bulking tank used for daily production. These data are given in Table VIII and it is seen that the Costa Rica crepe has slightly higher amounts of the lower fractions, and a higher sol content as compared with that shown for the rubber taken direct from the tree described in Tables VI and VII. The average sol content of the rubber from 24 trees was 80 per cent, whereas regular Costa Rica crepe was 86 per cent. The average intrinsic viscosity of the rubber from the 24 trees was 6.42 and the crepe in chloroform as shown in Table IV was 6.46.

It can be concluded from this study that the preparation of crepe, which involves considerable mill washing, increases the amount of sol and decreases the gel content a few per cent, but does not appreciably affect the viscosity of the sol fraction.

Difficultly Soluble Gel Fraction

The blend of samples 1 to 5 shown in Table III had an average gel content of 21 per cent whereas the gel residue from fractionation of this blend was 25.87 per cent, as seen in Table VI. This higher gel content from fractionation is due to a less exhaustive extraction of sol than was the case in the blend of samples 7, 14 and 17, which showed after fractionation a residual gel content of 9.3 per cent less than the average given for these samples in Table III.

Freeman *(7)* showed that the gel was present in latex as separate ultrafine particles which pass through a No. 1 sintered filter when fresh latex is dispersed into benzene or a vistex solution. These gel particles could be separated by adsorption on powders or by high speed centrifuging the vistex solutions. It is therefore reasoned that in coagulated latex rubber the gel is dispersed in the sol as minute particles. This gel phase can be dispersed into smooth solvent cements by ballmilling with the addition of a little butyl alco-

TABLE VII—FRACTIONATION OF COMPOSITE FROM RUBBER* TREES 7, 14 AND 17

Fraction No.	Benzene-Alcohol	Time Days	Extract Per Cent	Intrinsic Viscosity Chloroform	Nature of Extract
1	75-25	5	1.94	—	
1A	—	—	1.00	—	Resin extract from 1 with acetone
1B	—	—	0.94	0.56	Residual rubber in 1
2	75-25	6	0.90	0.79	Yellow, soft, sticky plastic
3	78-22	7	5.20	0.83	Light, yellow, soft plastic
4	80-20	4	7.00	2.18[1]	Pale yellow, some elasticity
5	80-20	7	2.60	2.42[2]	Pale yellow, some elasticity
6	82-18	7	15.20	7.59[3]	Nearly colorless, hard tough, elastic
7	82-18	7	20.80	9.31[4]	Colorless hard tough elastic
8	82-18	8	12.50	8.05[5]	Yellow tough elastic
9	82-18	11	6.50	7.88	Yellow tough elastic
10	Gel residue	—	25.42	—	

*2.5 gm. of alcohol coagulum pressed, cut fine and dried in air in the dark. (1) Fraction 4 in C_6H_6, (η) = 2.01; (2) Fraction 5 in C_6H_6, (η) = 2.32; (3) Fraction 6 in C_6H_6, (η) = 7.29, toluene 6.90 and cyclohexane 8.31; (4) Fraction 7 in C_6H_6, (η) = 9.02; (5) Fraction 8 in C_6H_6, (η) = 7.98.

hol. Upon solution by diffusion into a good solvent without agitation, the sol is extracted and the gel particles remain and become coalesced and highly swollen. The physical nature of the gel gives strong evidence that it is the product of linking of isoprene chains either by oxygen or carbon to carbon links.

The gel from the fractionation shown in Table VII was covered with methyl alcohol and pressed into a smooth compact sheet. It was then dried in a steam of CO_2. Measurements showed it had an elongation of about 300 per cent and a tensile strength of about 150 kg. per cm^2. (2100 lb. per in.^{2}).

The swelling index in chloroform of the gel was 24 and 16 in benzene whereas a vulcanized rubber band showed a swelling index of 7.

This gel will not dissolve in boiling tetrachlorethane which is a good solvent for soft vulcanized rubber. This might indicate a carbon to carbon linkage is involved instead of oxygen as is generally believed.

On account of the difficulties of purifying gel residues from solvent extraction from proteins, lutoids and other substances, no direct evidence of oxygen content is available. However, the method of separation by centrifuge as practiced by Freeman *(7)* might provide a suitable sample for analysis.

It was found *(2)* that chloroform residual gel after passing several times through a tight mill would dissolve and upon filtration most of the protein and other impurities were removed. The iodine value from this broken down gel was found to be 355. This corresponds to 95 per cent of the theoretical unsaturation of polyisoprene and is close to the value found for acetone extracted crepe rubber *(11)*. Analysis of the original gel showed a nitrogen content of 2.25 per cent and 1.32 per cent, whereas the broken down sol derived from this gel contained 86.97 per cent carbon, 11.70 per cent hydrogen and 0.21 per cent nitrogen with a hydrogen-carbon ratio 1.602, or very close to theory. The x-ray photograph of gel stretched 120 per cent gave the polyisoprene pattern.

The fact that different trees produce widely different amounts of gel is undoubtedly connected with differences in their synthesis. The mechanism whereby this takes place is not known as little positive information on the chemistry of rubber synthesis in the plant is available.

Solubility and Viscosity of Gel

After the exhaustive extraction of the gel shown in Table VII it was of interest to determine its solubility in different solvents and the viscosity of the solutions obtained since these data might throw some light on its structure.

Accordingly after drying, 0.1 gram of this gel was cut up fine and placed in 50 ml. of solvent in the dark with the air having been displaced over the solvent with CO_2. After several days the solution was decanted from the swollen gel and its sol content and viscosity determined. This procedure was repeated several times and the results obtained are shown in Table IX.

It is seen that the average solubility in benzene or chloroform is about 0.01 per cent and intrinsic viscosity 2.6. The solution may not have been completely saturated in every case. After eight treatments with chloroform, forty per cent of the gel had been dissolved and the results indicate that this gel is a fairly uniform substance which is the result of some cross-linking reaction in the plant synthesis of rubber.

Constitution of Sol Rubber

Bloomfield and Farmer *(12)* found the most soluble and the lowest viscosity fractions from crepe rubber contained up to 3.5 per cent oxygen and that the oxygen content decreased steadily as the fractions increased in viscosity.

Midgley *(13)* and co-workers found 0.04 per cent oxygen in purified crepe whole sol, half of which they found combined as hydroxyl.

Bloomfield *(1)* showed that rubber taken fresh from

the tree contained oxygen in the lower fractions, as was previously found in crepe rubber. About half of this oxygen was combined with active hydrogen and may therefore be combined as hydroxyl.

The present investigation also has shown the presence of these yellow, soft, sticky, low viscosity fractions in rubber taken directly from the trees in Costa Rica. The present author *(2)* also found 2.3 per cent of crepe rubber was present in fractions ranging in intrinsic viscosity from 0.4 to 1.4. The iodine value of these fractions ranged from 359 to 363 which is close to the value of polyisoprene of 373. Some of the double bonds are apparently saturated with oxygen.

Altman *(14)* has pointed out that due to the presence of powerful peroxidases rubber may be oxidized and broken down in the tree and this might explain the presence of the low fractions containing oxygen. On the other hand, the plant synthesis of rubber may involve precursors which contain oxygen and that these may remain combined at the chain terminals. The presence of powerful antioxidants in the latex would act to limit oxidation after the polyisoprene is formed.

Although the greater part of natural rubber direct from the tree contains high molecular weight straight chain polyisoprene sol with a cis head-to-tail structure, it may contain a very small amount of combined oxygen. In addition, rubber contains a few per cent of soft, sticky, low viscosity polyisoprene having a substantial amount of combined oxygen, together with varying amounts of a difficultly soluble gel which appears to have a three dimensional structure of polyisoprene from such evidence that is available. This study also indicates the presence of some of this nonlinear polyisoprene in the sol fraction.

Molecular Weight of Rubber

Widely divergent results have been reported for the average molecular weight of sol rubber in crepe, smoked sheets and in the average rubber latex fresh from the tree. The intrinsic viscosity range in benzene or chloroform for the whole sol in these types of rubber is quite narrow in most cases, the average being about 6.5 and rising to about 6.6 with the resins removed. It is, therefore, obvious that the extreme values given in the literature for the molecular weight of sol rubber must be the result of difference in the methods and procedures employed.

Caspari *(15)* was the first in 1914 to estimate the number average molecular weight of acetone extracted crepe sol in benzene and light petroleum solvents using the osmotic method. His data led to an estimate of about 125,000 for the molecular weight of whole crepe or about 100,000 if a correction in the concentration of the solutions was made for the usual gel content found in crepe rubber, which would not contribute appreciably to the osmotic pressure. Caspari's work was very carefully carried out using a porous cup impregnated with sulfur chloride vulcanized rubber as the semi-permeable membrane and allowing long periods to reach equilibrium.

The estimates of numerous other investigations following Caspari up to the present time using osmotic, viscosity, ultra centrifuge, light scattering and chemical means range from 68,000 to about 1,500,000. The more recent publications appear to be accepting the higher values which are based on the osmotic method.

The osmotic method if not subject to variations due to procedure should yield absolute values; however, it has been recently recognized that membrane and other difficulties in the osmotic method lead to ab-

TABLE VIII—FRACTIONATION OF COSTA RICA CREPE

(2.5 gm. in 100 ml. solvent)

Fraction No.	Solvent Benzene-Alcohol	Time Days	Extract* %	Intrinsic Viscosity
1A	75-25	7	2.34	Resin
1B	75-25	7	1.53	0.64
2	75-25	6	1.28	0.64
3	78-22	13	3.90	0.99
4	80-20	9	9.18	1.60
5	80-20	36	5.12	1.77
6	81-19	7	12.65	4.35
7	Benzene	11	12.87	7.05
8	Benzene	10	31.45	6.85
9	Benzene	7	3.27	6.90
Gel residue	——	—	16.41	—
			100.00	

*Table VI, 6-16.1% int. vis. range 0.1-1.89; Table VII, 7-18.4% int. vis. range 0.56-2.42; Table VIII, 8-23.3% int. vis. range 0.64-1.77.

TABLE IX—FRACTIONATION OF GEL

(0.1 gm. of gel in 50 ml. solvent)

IN CHLOROFORM

Fraction No.	Extraction Time-Days	Solubility of Gel Gm./100 Ml.	% Gel Dissolved in 50 ml.	Intrinsic Viscosity of Solution*
1	6	0.0100	5.0	3.27
2	4	0.0102	5.2	1.70
3	6	0.0132	6.6	3.28
4	8	0.0136	6.8	1.84
5	7	0.0062	3.1	2.13
6	6	0.0072	3.6	2.62
7	7	0.0110	5.5	2.06
8	19	0.0080	4.0	4.10
		Average 0.0099	5.0	2.63
		IN BENZENE		
1	10	0.0124	6.2	2.23
2	6	0.0080	4.0	1.81
3	7	0.0072	3.6	2.40
4	19	0.0100	5.0	2.76
5	14	0.0064	3.2	3.61
		Average 0.0088	4.4	2.56

*Relative viscosities of solutions of 25.0°C. ranged from 1.0151 to 1.0452.

Samples taken at the Speedway Estate indicate wide variations in characteristics of rubber from individual trees.

normally high results which are many fold higher than the true values.

Staudinger's viscosity method indicated the molecular weight of crepe rubber sol to be about 150,000, a value close to that found by Caspari.

Until more work has been carried out to standardize and prove the osmotic method the writer is of the opinion the values obtained by Caspari and Staudinger may be close to the truth. It is for this reason no molecular weight values are given in this paper. The intrinsic viscosity data will suffice to indicate the molecular weights if the formula

$$(\eta) = 5 \times 10^{-5}M$$

is employed as this reflects the results obtained by Caspari which are probably the most dependable in view of the procedure used in his measurements. Further work must be carried out to determine the true molecular weight of rubber and the most reliable relation between viscosity and molecular weight.

Carter, Scott and Magat *(16)* from viscosity and osmotic molecular weight measurements on fractions from smoked sheets found the relation

$$(\eta) = 5.02 \times 10^{-4}M^{0.667}$$

and this has been employed by various investigators recently. This relation leads to values more than ten times higher than Caspari's or Staudinger's early values, for the molecular weight of sol rubber from crepe or smoked sheets.

Summary and Conclusions

A special procedure of collecting rubber latex directly from the tree by dropping it directly into alcohol to coagulate and preserve it has been described.

The color, hardness and solubility in benzene or chloroform and viscosity of the soluble portion of this alcohol-coagulated rubber has been found to vary widely in the case of rubber from 24 individual trees in a Costa Rica rubber estate. While it is shown that rubber from individual trees show wide variations, the results from bulked latex and crepe are close to the average results found for the 24 trees.

The results from the present investigation show that rubber direct from the tree contains soluble and insoluble fractions like those found in crepe and smoked sheet. Lower polymers in crepe and smoked sheet are also present in the latex as it emerges from the tree. It was found that some trees yielded a rubber almost completely soluble in benzene or chloroform, while in others, the soluble portion was as low as 61 per cent, with the average being 80 per cent. High viscosity of the sol and high insoluble gel both lead to hard tough rubber.

The alcohol coagulums varied widely in color from almost white in the case of some trees to various shades of cream in most of the others. A new and unexpected finding was that four of the 24 trees yielded a distinctly grey mottled coagulum. This grey color apparently comes from the presence of clotted grey lutoids not apparent in the latex itself.

The constitution of sol and gel rubber is discussed and data are presented on the solubility and viscosity of the solutions obtained from the gel fraction. From these results it is concluded that the difficultly soluble gel has a three dimensional network structure with either oxygen or carbon to carbon linkages between the polyisoprene chains.

ACKNOWLEDGMENT

The author wishes to thank R. P. Dinsmore and W. E. Klippert of the Goodyear Tire and Rubber Co. in Akron, Ohio, for permission to visit the Speedway Rubber Estate in Costa Rica. Also, the writer is indebted to Hernan Echeverri, manager of the Speedway Estate, for his kind cooperation in arranging for the collection of samples.

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Determining the Bound Styrene in Styrene-Butadiene Copolymers

A streamlined method involving nitration and spectrophotometric analysis

By C. L. HILTON
Research Center,
U. S. Rubber Co.,
Wayne, N. J.

AS MENTIONED in a previous paper *(11)*, the three most widely used methods for the determination of bound styrene are index of refraction *(2, 4, 10)*, infrared absorption *(3, 7, 9)* and ultraviolet absorption *(6, 13, 14)*. Accurate results by any of these procedures require separation of the polymer from all other ingredients in the stock. Losses of polymer may result from degradation or from adsorption of the polymer on the filter aids used to remove carbon black and fillers. X-ray diffraction *(8)*, mass spectrometry *(12)*, reaction rates with nitric-sulfuric acid mixture *(15)* and density measurements *(16)* have also been used.

The present paper describes a modification of our original procedure *(11)* which eliminates the several ether extractions. The procedure involves nitration and oxidation of the polymer to form *p*-nitrobenzoic acid. The latter is converted to the sodium salt and is determined spectrophotometrically. The qualitative method in the British User's Memorandum *(5)* and the quantitative ASTM method *(1)* involve nitration with nitric acid followed by oxidation with alkaline permanganate. Since we have found that nitric acid reacts with styrene-butadiene copolymers to form *p*-nitrobenzoic acid, no other oxidizing agent was used.

Although it is well known that nitric acid and nitrates show strong ultraviolet absorption, correction for the residual nitric acid should not be difficult. The absorption maximum for the reaction product from styrene-butadiene copolymers is very close to 275 millimicrons. Sodium nitrate absorbs most strongly at 300 millimicrons. The maximum absorption for most styrene-butadiene copolymers in the presence of the residual nitric acid is in the vicinity of 285 millimicrons. Thus these three wavelengths were chosen.

The accuracy and precision of the streamlined procedure are satisfactory for those laboratories, where exact answers are not required. The absolute error rarely exceeds 1.0%.

Apparatus, Materials and Procedure

For this work a Cary Recording Spectrophotometer Model 11 with 1.000 cm. silica cells was used. The slit widths were 0.104 mm at 300 mμ; 0.121 mm at 285 mμ; and 0.138 mm at 275 mμ.

The reagents were: Concentrated nitric acid, Baker's analyzed reagent grade, 69.9%, specific gravity 1.420, and sodium hydroxide pellets, reagent grade, 4*N*., 160 grams per liter (distilled water).

The procedure is the following: Weigh a sample of chloroform-extracted cured stock, or alcohol-extracted raw stock. By keeping the sample weight between 0.1495 and 0.1505 gram, correction for residual nitric acid can easily be incorporated into the final equation.

Put the weighed sample in a 125 ml. standard taper flask, and add 20 ml. of concentrated (69 to 71%) nitric acid. Add a few boiling chips, and insert a water-cooled Graham condenser.

Graham Ful-Jak condensers (Scientific Glass Apparatus Co.) are better than Allihn condensers in the digestion apparatus. They reduce the loss of nitric acid and the air oxidation of *p*-nitrobenzoic acid during digestion.

Place the flask on a cold electric hotplate. Turn on the heat and allow the sample to reflux rather vigorously for at least 16 hours. The sixteen hour digestion period was selected after it was found that the amount of *p*-nitrobenzoic acid formed by this reaction is constant from 16 hours to 32 hours. Longer periods were not studied.

After the first hour, the space in the flask above the boiling acid should contain only slight brown fumes, most of the brown fumes being well up in the condenser. Pour 10 to 20 ml. of distilled water

TABLE I—ABSORPTIVITY VALUES FOR STYRENE AND BUTADIENE

	275 mμ	285 mμ	300 mμ
Polystyrene	75.30	67.73	46.17
Polybutadiene	1.30	1.00	0.70

into the top of the condenser, and turn off the heat. The water will be slowly drawn down into the flask, washing the condenser. Allow the reaction mixture to cool enough to permit handling the flasks.

Disconnect the condenser and rinse the standard taper joint with distilled water. The sample and washings are transferred to a one liter volumetric flask containing 100 ml. of 4*N*-sodium hydroxide. The sample is brought to the mark. A 50 ml. aliquot is transferred to a 250 ml. volumetric flask and diluted to the mark with distilled water. Determine the absorbance at 300, 285, and 275 mμ using a suitable spectrophotometer. Calculate the per cent styrene present.

Theory

It is assumed that when a butadiene-styrene polymer is nitrated, and the nitration products are examined for ultraviolet absorption, the absorption due to the styrene nitration products is proportional to the styrene content of the polymer. The absorption due to the butadiene nitration products is proportional to the butadiene content.

The following formula is for a pure polymer:

$$a_s \text{ (polymer)} = Xa_{s\ (\text{styrene})} + (1\text{-}X)a_{s\ (\text{butadiene})} \quad (1)$$

where X and (1-X) are the fractions of styrene and butadiene respectively and a_s is the absorptivity for the material concerned. Absorptivity equals A_s/bc. A_s is the absorbance of the solution, b is the optical path in centimeters, and c is the concentration in grams per liter.

Results

Since the residual nitric acid is not removed from the solution, the absorbance reading must be corrected for the nitric acid content prior to calculation of absorptivity values. The absorbance values per milliliter of residual nitric acid were found to be 0.00797, 0.01392 and 0.02190 at 275, 285 and 300 mμ respectively. By titration of the remaining nitric acid in each sample, the proper absorbance correction was determined. Absorptivity values for polybutadiene and polystyrene were determined using the corrected absorbance reading (Table I).

When these corrected absorptivities are placed into equation 1, equations 2, 3, and 4 result:

$$\% \text{ Styrene} = 1.35\ a_{s275} - 1.76 \quad (2)$$
$$\% \text{ Styrene} = 1.50\ a_{s285} - 1.50 \quad (3)$$
$$\% \text{ Styrene} = 2.20\ a_{s300} - 1.53 \quad (4)$$

Since the sample weight is always 0.1500 ± .0005 gram, the concentration is 0.0300 ± 0.0001 gram per liter. The equations then become:

$$\% \text{ Styrene} = 45.00\ A_{s275} - 1.76 \quad (5)$$
$$\% \text{ Styrene} = 50.00\ A_{s285} - 1.50 \quad (6)$$
$$\% \text{ Styrene} = 73.33\ A_{s300} - 1.53 \quad (7)$$

The absorbance values in each case must be corrected for the residual nitric acid content. If X equals the number of ml. of nitric acid remaining, the equations become:

$$\% \text{ Styrene} = 45.00\ (A_{s275} - .00797X) - 1.76$$
or
$$\% \text{ Styrene} = 45.00\ A_{s275} - 0.3587X - 1.76, \quad (8)$$
$$\% \text{ Styrene} = 50.00\ (A_{s285} - 0.01392X) - 1.50$$
or
$$\% \text{ Styrene} = 50.00\ A_{s285} - 0.6960X - 1.50, \text{ and} \quad (9)$$
$$\% \text{ Styrene} + 73.33\ (A_{s300} - 0.2190X) - 1.53$$
or
$$\% \text{ Styrene} = 73.33\ A_{s300} - 1.6059X - 1.53. \quad (10)$$

Since things equal to the same thing are equal to each other, the right side of equation 8 can be set equal to the right side of equation 9. Solving for x, we obtain equation 11:

$$X = 148.25\ A_{s285} - 133.43\ A_{s275} + 0.77 \quad (11)$$

Inserting the value for x in equation 8 or equation 9 yields equation 12:

$$\% \text{ Styrene} = 92.86A_{s275} - 53.18A_{s285} - 2.04 \quad (12)$$

Equation 13 is obtained in a similar manner from equations 8 and 10:

$$\% \text{ Styrene} = 57.94\ A_{s275} - 21.09\ A_{s300} - 1.82 \quad (13)$$

If the per cent styrene calculated by equation 12 is not within 2% (relative) of the results by equation 13, interferences are probably present and the extraction procedure described elsewhere *(11)* should be used.

Table II shows the results obtained when equations 12 and 13 were applied to a series of mixtures of polystyrene and polybutadiene. (The use of equations 12 and 13 renders titration of the residual nitric acid unnecessary.)

TABLE II—DETERMINATION OF STYRENE IN KNOWN MIXES

% Styrene Taken	% Styrene Found by Equation 12	% Styrene Found by Equation 13	Average	% Error Relative
0.00 (4) samples	±0.13	±0.13	±0.13	
13.15	12.81	12.92	12.87	—2.13
13.18	12.85	12.85	12.85	—2.50
20.03	19.75	19.98	19.87	—0.80
20.12	19.81	20.18	20.00	—0.60
33.44	33.21	33.60	33.40	—0.12
33.20	32.97	33.16	33.07	—0.39
49.87	50.17	50.49	50.33	+0.92
49.97	50.71	51.13	50.92	+1.90
66.60	66.87	67.31	67.07	+0.71
66.58	68.30	68.71	68.50	+2.88
80.02	80.07	80.26	80.16	+0.13
80.12	80.27	80.37	80.32	+0.25
100.00 (5 samples)	100.46	101.69	101.08	+1.08
			Average	±1.10

Interferences and Applicability

Interferences include accelerators, antioxidants, aromatic compounds and certain heterocyclics. The compounding ingredients including oils would be readily removed by extraction. Such materials as α methylstyrene, vinyl toluenes, ethylstyrenes, and divinylbenzenes will yield similar nitration products and cannot be distinguished from styrene by this method.

Although the method was developed specifically for styrene-butadiene copolymers, it is applicable to styrene-acrylonitrile resins, terpolymers, grafts and blends.

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Coming Next Month...

Effects of Gamma Radiation on Nitrile Elastomers—By Robert Harrington, Hanford Laboratories Operation, General Electric Co., Richland, Wash.

The fifth in a series of articles concerns the effects of ionizing radiation on the physical properties of nitrile elastomers, and also contains data on a group of flexible plastics.

The Use of Polyether Triols in Urethane Foams—By R. K. Seizinger, S. Davis, J. M. McClellan and K. C. Frisch, Research Division, Wyandotte Chemicals Corp., Wyandotte, Mich.

Information on a new series of materials which provide a wide range of foam properties.

The Chemistry of Reinforcement—IV: A Model System Based on Carbon Black, Squalene, TMTD and Laurex—By Merton L. Studebaker and Lester G. Nabors, Rubber Chemicals Division, Phillips Chemical Co., Akron, Ohio.

A further study of the effect of carbon black in rubber during vulcanization examines a model system for a black loaded TMTD cure.

How Crown Rubber Solved Its Steam Problem—By Clarence Augustine, Plant Manager, Crown Rubber Co., Fremont, Ohio.

How installation of a package boiler system eliminated a shortage of steam which was hampering production.

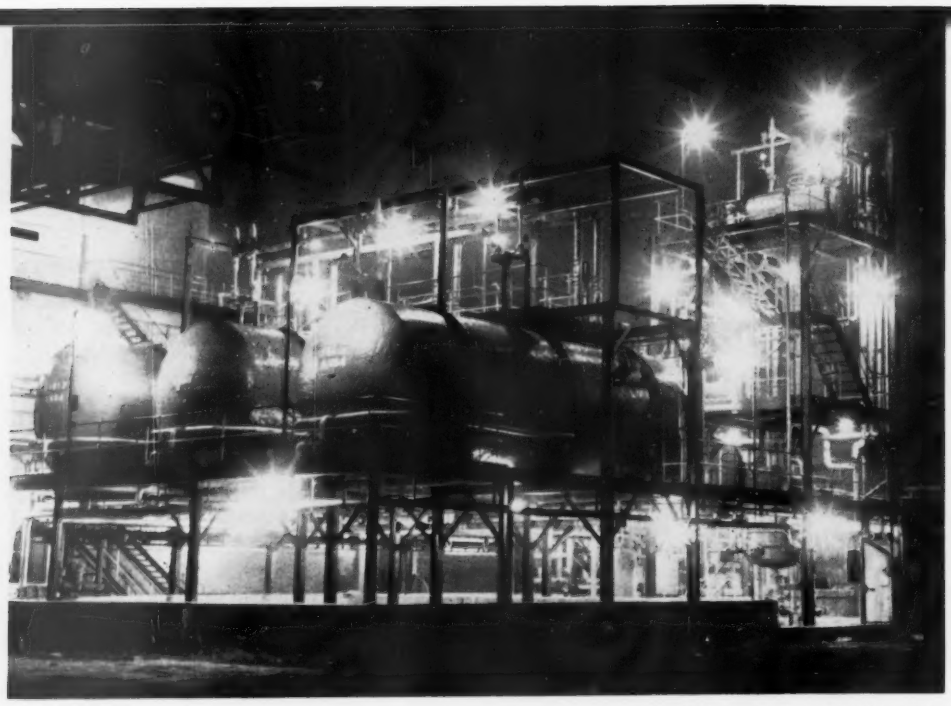
Uses of Hypalon-Coated Nylon Fabrics—By Langley W. Isom, Product Manager, Vulcan Rubber Products Division, Reeves Brothers, Inc., New York, N. Y.

Why Hypalon-coated nylon fabrics are finding application in a variety of end-uses which subject them to unusually severe service conditions.

PLUS R/A SPECIAL INDUSTRY REPORT

Factoring in the Rubber Industry

Factoring, by which the manufacturer sells his existing or projected accounts receivable to an outside organization, offers advantages to the rubber manufacturer.



Tank storage section of the Monsanto copolymers plant at Newport, Monmouthshire.

European Report: ENGLAND

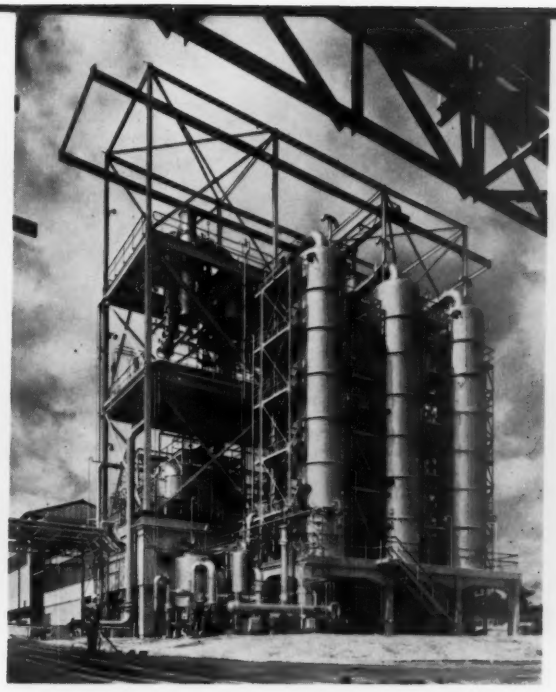
THE RUBBER technology of England rests upon three centuries of research and development ranging from Hooke's first inquiry into the property of elasticity to the latest applications of atomic energy in the production of "graft and block" polymers. Its rubber industry, close to 140 years old, started in 1820 when Thomas Hancock began making the first garter elastic in a London workshop. Since then it has grown into one of the top ten industries of the country employing approximately 112,000 people and consuming well over a quarter of a million tons of raw rubber annually. Second only to the United States in the world rubber picture, and consumer of more tons of rubber per year than all of the rest of western Europe combined, England is the logical starting point for a survey of the rubber industry abroad.

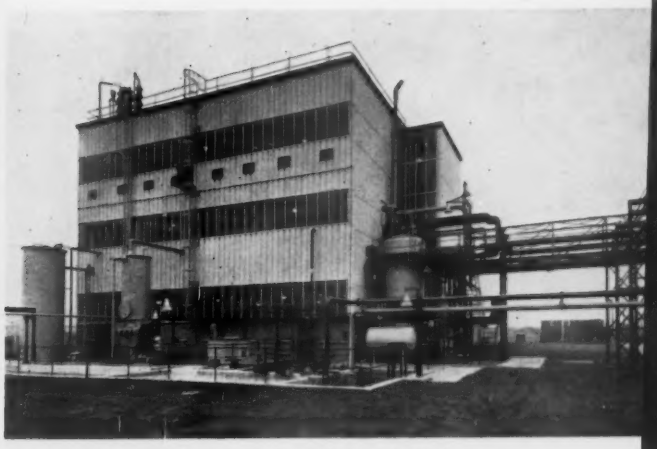
Although synthetics account for better than sixty per cent of the raw rubber consumed in the United States, natural rubber remains the basic raw material of England's rubber industry. Because of its interests in the large plantation estates of Malaya, England draws its supply of natural rubber predominantly from that country. Notwithstanding the fact that Malaya is one of the major centers of the large producing estates, figures obtained from A. G. Pawson, Secretary General of the International Rubber Study Group, indicate that better than 50% of the Malayan production comes from the smallholders rather than the estates.

Stuart C. Covell, Director of the Federation of British Rubber and Allied Manufacturers, pointed out in an interview that the price of natural rubber was controlled to a great extent through the marketing of this rubber from the smallholder. The dealers, most of whom are Chinese, often obtain the rubber from the smallholders by the barter system, many times advancing them rice for food prior to the tapping of the trees. These dealers then use international situations and economic conditions to increase their prices.

As an example of this price fluctuation, in the one-year period from June, 1955 to June, 1956, a period which was not characterized by any exceptional political or economic tension, the price varied from 24½ cents to 51 cents per pound. Conditions of this type are highly detrimental to the long terms interests of the producer and manufacturers alike and have been a significant factor leading to the increased use of synthetic rubber in other countries throughout the world. In 1958, however, only a little over 25% of England's total consumption was synthetic rubber in spite of the fact that the instability of natural rubber prices is a serious handicap to its industry.

W. G. G. Kellett, chief executive officer of the Rubber Growers' Association in London, reported in an interview that he did not feel there would be a





The Barry, Glamorganshire, plant of British Geon Limited where a range of acrylonitrile copolymers is manufactured.

Recovery unit at the new International Synthetic Rubber plant at Hythe on the shores of Southampton Water.

The first of four articles on the rubber industry in Europe analyzes current developments in Great Britain

By JAMES B. BRADEN

United Carbon Co., Inc., Akron, Ohio

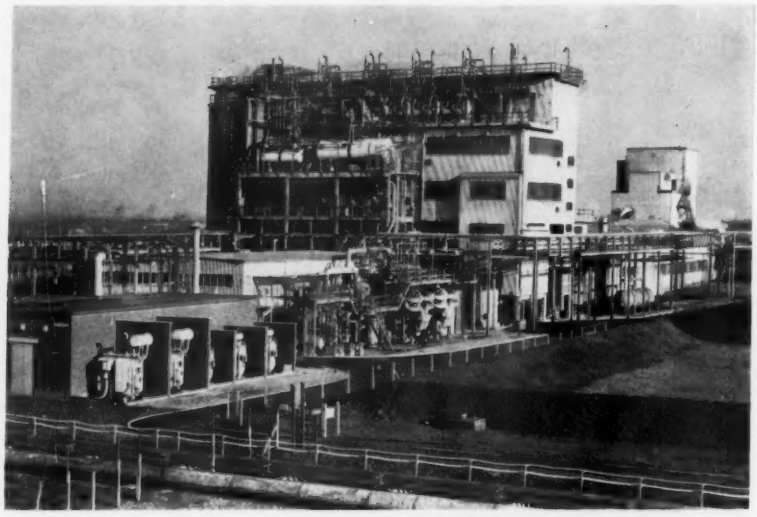
major change in the production or consumption of natural rubber in the foreseeable future. He added that although there would be an increase in the total usage of rubber, the current natural rubber consumption would be supplemented by the increasing use of synthetics.

Expanding Synthetic Production

To meet the rising demand for styrene rubber, the International Synthetic Rubber Company constructed a plant at Hythe on the shores of Southampton Water at a cost of $168,000,000. The plant was started in February, 1957 and reached full production in July, 1958. It has a very favorable position in that the styrene is transported to the plant by road, rail, and sea tankers from Forth Chemicals at Grangemouth and Shell at Partington. The difficulty of transporting butadiene was the main reason that large-scale synthetic rubber manufacture in England had to wait the development of a suitable oil-cracking plant. The new Fawley Refinery of the Esso Petroleum Company, Ltd., is just short of two miles from the Hythe plant to which it is joined by a pipeline.

Heretofore all styrene rubber had been imported from the United States, Canada, and Germany. It is estimated that this new plant at Hythe will save Britain some $25,000,000 a year in foreign currency and will also enable Britain to compete in the export marketing of synthetic rubber. The consumption of styrene rubber amounted to approximately 2% of the total raw rubber used in 1958, and all indications are that it will increase in the future. However, it is not anticipated that the need will be as great percentagewise as in the United States because of the differences in relative output of various products. In particular, the proportion of passenger tires for which styrene rubber is now generally used, to the large commercial truck tires, for which natural rubber is still technically preferable, is a good deal higher in America than in England. However, the 70,000 ton capacity of cold rubber which can be produced at the Hythe plant should be sufficient for England's requirements plus excess rubber for export.

In addition to the new International Synthetic Rubber Company plant, there are six other synthetic plants in the United Kingdom with a seventh under construction. These include the Dunlop experimental plant at Birmingham with a capacity close to 2000 tons per year of various special-purpose rubbers for use in the Dunlop laboratories and development projects; the Imperial Chemical Industries plant at Wilton producing up to 10,000 tons a year of butadiene polymers, including nitrile and methacrylate rubbers and also high-styrene co-polymers; and Monsanto whose plant at Newport makes high styrene-butadiene copolymers. This plant has an output of 4,000 tons



The Imperial Chemical Industries plant at Wilton, Yorkshire, where up to 10,000 tons a year of butadiene polymers are produced.

per year and is capable also in the future of producing nitrile rubber.

Meanwhile, a plant constructed by British Geon (a subsidiary of Distillers Co.) for the manufacture of nitrile rubber at Barry, Glamorganshire, came into production early in 1958. Two British companies are presently making silicone rubbers — the I.C.I. at Ardeer, and Albright and Wilson (for Midland Silicones) also at Barry, Glamorganshire. Lastly, the new neoprene plant being built by DuPont in Maydown, Ireland is expected to be in production sometime this year.

England and the Continental Economy

Clarifying England's position in the European rubber economy, D. A. Bennett, General Manager of the International Synthetic Rubber Company reported as follows late last year in the *Manchester Guardian:* "By 1961 the western European capacity for producing synthetic rubber will have reached at least 200,000 tons of SBR besides 20,000 tons of butyl rubber and possibly 30,000 tons of neoprene, nitrile, and special purpose synthetics. Moreover, with these facilities established, expansion of this output by 50% would be easy."

In view of this statement, the question arises as to whether there will be a market for this increase in synthetic rubber production. In 1958, the consumption of synthetic rubber in western Europe was a little over 200,000 tons and, with the expected rise in the demand for synthetics together with the possibility for exports to other parts of the free world, the English have reason to believe that this planned capacity will find a market. Of importance to the American synthetic producer, however, is the assumption in this calculation that the imports of synthetics from the United States and Canada will be entirely replaced by European production, which of course would have a decided influence on American production. Again according to Bennett:

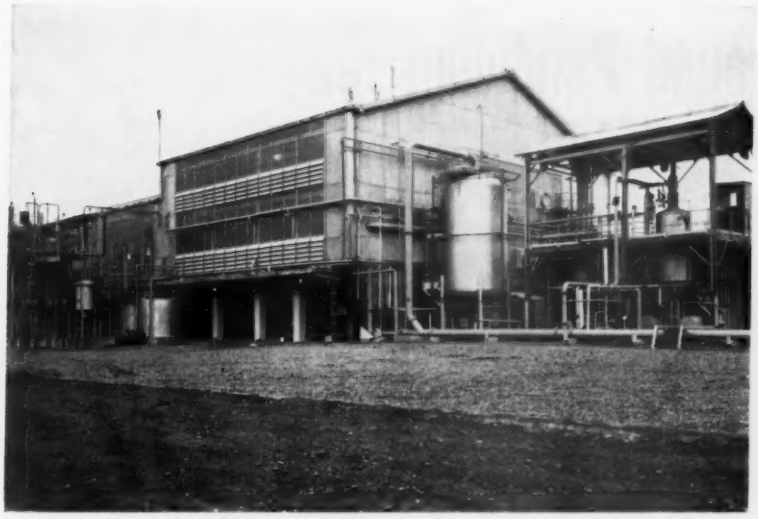
"On a world scale the situation looks somewhat different. Present estimates put the rubber requirements of the free world in 1961 at something over three and a half million tons, of which more than two million tons may be supplied by natural rubber, leaving a market for a little over one and a half million tons of synthetics. By that time, however, capacity for synthetic rubber will be well over two million tons or at least half a million tons more than is required. In due course this surplus should be taken up in a general rise in the world consumption. The production of natural rubber is relatively inflexible and is not expected to rise by more than 12½% in the next five years, during which time total rubber consumption may be expected to increase by more than 25%. For the moment, however, surplus capacity may lead to a certain amount of price competition. Already in 1958 with the opening of several European synthetic plants, the price of SBR from dollar sources was reduced by almost one cent per pound."

Several new developments may also have a bearing on the future consumption of natural and synthetic rubber in England. The first, a technical advantage for natural rubber, was the development of a "Superior Processing Rubber" by the Rubber Research Institute of Malaya and the British Rubber Producers Research Association. A blend of 20% vulcanized latex and 80% unvulcanized latex produces a product with considerably less swell and smoother extrusion characteristics. Although selling at a two or three cent premium, its future looks promising.

A second factor has been the approval of a PVC conveyor belt for the coal industry which could affect the consumption of neoprene.

Another interesting point is that the new DuPont plant in Ireland is reported to be setting up for the production of Type W neoprene even though the English manufacturers apparently still use predominantly the G types. This leads one to believe that this plant is planned to compete in the export field.

With regard to the future, Covell stated that it was not inconceivable that in the long term, natural rubber and synthetic would hold equal positions in the world rubber picture. He also stated that, probably until about 1962 or 1963, total production of



The Dunlop experimental plant at Fort Dunlop, Birmingham, which produces rubbers for evaluation in the company's research laboratories and factories.

all rubber would be strained to meet demand; at that time, then, lower prices would develop, and inasmuch as rubber growers are not inclined to tap their trees during low price periods, a further demand would be put on synthetic production.

The Common Market Problem

With regard to export, Covell observed that the United Kingdom must do something about the Common Market. This possibly could be the understatement of the year.

The European Economic Community, usually spoken of as the Common Market, consists of the six European Coal and Steel Community member nations: West Germany, France, Italy, Belgium, Luxembourg, and the Netherlands. This integration started at Messine in June, 1955 under the leadership of Prime Minister Spaak. After long negotiations the Community's treaty was written and approved by the six countries at a meeting in Rome in March, 1957.

This Common Market implies that over a period of twelve to fifteen years the following will be accomplished:

(1) The abolition, as between member states, of the obstacles to the free movement of persons, services, and capital.

(2) The establishment of a common customs tariff and a common commercial policy toward third countries.

(3) The inauguration of a common agricultural and transport policy.

(4) The coordination of economic policies of member states and a certain approximation of national legislation.

This new community has an area of 450,000 square miles and a population of 162,000,000 people and at present this apparently expanding market represents 14% of England's exports. England, on the other hand, is in favor of a much larger Atlantic community which would not jeopardize its relationship with the Commonwealth, the sterling area, and the United States.

Along with England on the outside of the Common Market are the ten other members of the OEEC (Organization for European Economic Cooperation) including Switzerland, Austria, Norway, Sweden, Denmark, Portugal, Ireland, Iceland, Greece, and Turkey.

The first crisis passed when it was announced on December 3, 1958 that the Common Market Council of Ministers had extended the first 10% tariff reduction scheduled for January 1, 1959 to all of the members of GATT (General Agreement on Tariffs and Trade), a group which included all of the OEEC members as well as some others. However, even though the problem of discrimination was solved for the moment with regard to tariffs, the problem of adjustments being made in quotas within the Common Market remained. As a result, German cars sold in France, for example, will have a distinct advantage over British cars, and the free trade being developed within the Common Market will constitute discrimination to everybody else.

Those in favor of the Common Market predict expanding economies for the member nations and a resulting stimulus for world trade in general. However, a European community without Great Britain is something else again, and the English and other Europeans are acutely aware of the dilemma.

Since the rubber industry is an integral part of Britain's total economy it seems only logical that England will do its part to retain and expand its continental market to enhance that economy. Britain always has been and doubtless will remain essential to Europe. If England decides to adopt the methods of the Common Market or if some form of association for a larger community develops, it will be done for the common interest and the rubber industry may be expected to continue to grow and prosper in this and the rest of the free world's communities.

A Modified Rebound Pendulum for evaluating flexible foams

By L. A. ROSENTHAL and G. I. ADDIS
Development Laboratories, Union Carbide Plastics Co., Bound Brook, N. J.

By modifying a rebound pendulum, it is possible to study in greater detail the impact properties of flexible foam materials. The pendulum is integrated with a precision potentiometer so that angular position versus time curves can be plotted on a recorder. The pendulum is given an initial displacement (or potential energy) and, as it strikes and rebounds from the foam material under test, several impacts are automatically recorded. The energy lost per impact can be obtained for several cycles and the non-linearity in resilience can be rapidly evaluated. In addition, the dynamic deformation of the sample, under impact, can be rapidly ascertained. Typical observed data are presented and discussed together with the operation and theory of the equipment.

The apparatus conveniently provides significant dynamic impact data for resilient foam materials and can be useful in specifying characteristics or conducting studies of such materials.

TO STUDY, evaluate, and compare properly the new flexible foam materials, industry needs various static and dynamic testing procedures. A static test, for example, of force (compression) versus deflection is unquestionably useful to researchers, as are the many other such tests that have been suggested. Dynamic tests range from the simple qualitative one of bouncing a steel ball on a foam material and counting the number of bounces to the more sophisticated tests that will be described in this discussion. The purpose of all these tests is to provide a reliable basis for the study and evaluation of flexible materials. However, it is only with experience that certain test procedures will become more popular because it is found they yield the greatest amount of significant information with the least possibility of experimental error.

In the area of dynamic testing, several test procedures have been suggested. ASTM Standards give a test entitled "Impact Resilience and Penetration of Rubber by the Rebound Pendulum" (ASTM D1054-55). This test measures resilience by the degrees of rebound of the pendulum when the pendulum is dropped from a standard angular displacement from the vertical. Pawls on a track record the height to which the pendulum rebounds; a micrometer is utilized to measure penetration.

ASTM Standards [Felix L. Yerzley, "A Mechanical Oscillograph for Routine Tests of Rubber and Rubber-Like Materials," *Proceedings of the American Society of Testing Materials,* Vol. 39, p. 1180 (1939)] also describe a test using the Yerzley Mechanical Oscillograph (D945-55) to determine resilience, dynamic modulus and some static properties of elastomeric vulcanizates. Slight modification of the Yerzley apparatus might make it useful in the testing of foams, although the high damping rates of many foams may make it difficult to get sufficient data from the machine.

The Chrysler Corporation Material Standard No. MS-AY33 (tentative) Rev. C, a specification for polyurethane foam, utilizes a rebound pendulum to measure resilience. In this test a pendulum of some fixed mass and length is released from an angular displacement of 15 degrees from the vertical rest position. The degree of rebound serves as a measure of resilience.

It appears that by modifying the rebound pendulum principle so that the readout is electrical and continuous, it is possible to obtain a great deal of information with very simple techniques. In addition to providing resilience and dynamic-stiffness information, nonlinearities in these two parameters are also obtained since several "bounces" are incorporated in the experiment.

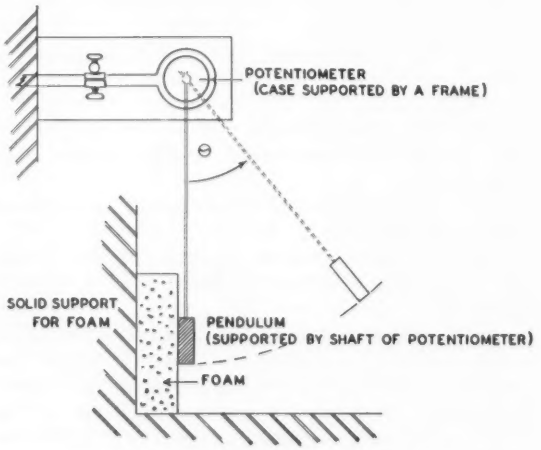


FIG. 1—Mechanical layout of components of tester.

Note: This paper was presented before the Fifteenth Annual Technical Conference, Society of Plastic Engineers, New York, N. Y., January 27-30, 1959.

Resilience ρ is "the fraction of energy returned after a bounce" x 100, i.e., percentage rebound.

$$\rho = \frac{E_b}{E_a} \times 100$$

where E_a = Energy of the system before the bounce, and
E_b = Energy of the system after the bounce.

Dynamic stiffness is here defined by the depth of penetration of a given mass striking the foam at some reference velocity.

The nonlinearity in resilience may, for example, prove to be an important parameter in specifying whether a material makes a good seat cushion or not.

Description of the Equipment

In this modified test the fixed pivot point for the pendulum becomes the shaft of a precision ball-bearing potentiometer, making the angular deflection of the pendulum available at all times as an electrical signal output of this potentiometer. The electrical output can be recorded during the bouncing of the pendulum and, then, properly interpreted. Figure 1 is a sketch of the mechanical system. A pendulum about 14 inches long was suspended from the shaft of a continuous-rotation potentiometer using the ball-bearings of the potentiometer as the bearing or support for the pendulum. The weight was two pounds and the free period was 1.25 seconds. The case of the potentiometer was mounted on a frame in such a way that the apparatus could be adjusted for various foam thicknesses. A 45-volt battery was connected across the potentiometer and a centering device was added so that the pendulum deflection recorded by a Sanborn recorder (Sanborn Co., Cambridge, Mass.) used would be zero when the pendulum was at rest just touching the foam surface. Figure 2 is a representation of the electrical system used. As shown in Figure 2,

V_0 = battery voltage,
V_1 = voltage between point x and the brush of R_1 (Zero-Set),
V_2 = voltage between point x and the brush of R_2 (Active), and
V_3 = voltage seen by the recording apparatus.

The quantity θ is defined as the angular displacement of the pendulum (in radians) from the rest position; θ is called positive for displacement away from the foam and negative for displacement into the foam. It is possible to connect R_2 in such a way that an increase in θ results in an increase in V_2. Then

$$V_2 = \left(\frac{m + \theta}{2\pi} \right) V_0$$

where m depends on how the potentiometer happened to be oriented when connected in the apparatus, a constant; and

$$V_3 = V_2 - V_1.$$

If the centering potentiometer is adjusted so that

$$V_2 = 0 \text{ when } \theta = 0$$

then

$$V_1 = \frac{m V_0}{2\pi}$$

and

$$V_2 = \frac{\theta V_0}{2\pi},$$

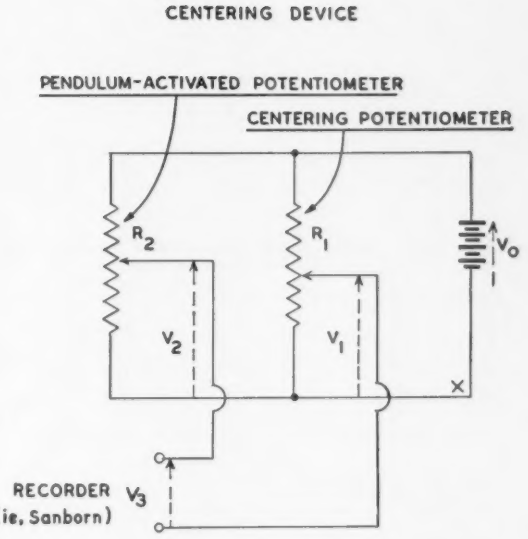


FIG. 2—Electrical circuit for angular position of readout.

i.e., V_3, the voltage recorded by the apparatus, is directly proportional to the angular displacement of the pendulum.

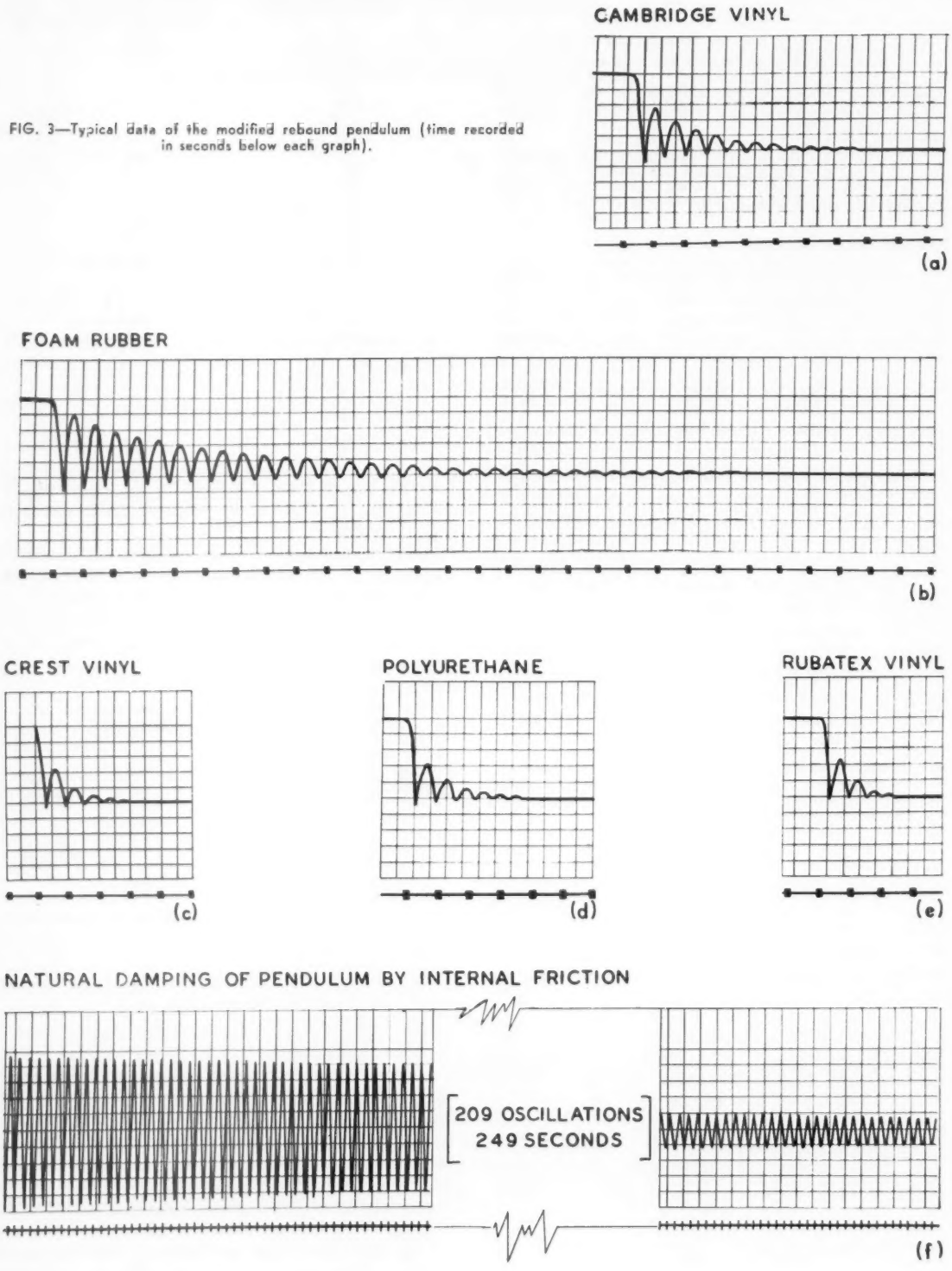
Thus the voltage, V_3, is an analogue of the angular displacement of the pendulum as measured from the resting position on the surface of the foam. If the recorder range is selected properly, the recording will indicate a corresponding constant deflection as the pendulum is displaced to some position θ_1. When released, the "bouncing" will trace out a curve such as shown in Figure 3. These recordings are typical sample recordings for the system described. In Figure 3f, there is no sample and the recording is close to a sine wave typical of a pendulum oscillation with small amplitudes. This curve was obtained to establish, for future calculations, the fact that the internal damping of the pendulum system was negligible. Note that one-second timing pulses are recording beneath each recording.

Consider Figures 4a and 4b wherein

θ_1 = angular displacement of the pendulum in radians at time t_1,
L = length of pendulum,
h_1 = is the height of the recording at t_1,
s = vertical height to which the pendulum has been raised above the rest position, and
W = weight of pendulum.

The recorded signal height $h = k\theta$ where k is some constant for the particular recording setup. The height at t_1 is determined by the height s to which the pendulum is raised before releasing. At t_2 the pendulum is in the foam; the depth to which the pendulum penetrates is obtainable from the maximum negative value of h at t_2. At t_3 the pendulum has rebounded and has achieved a maximum angular displacement for the first bounce. At t_4 the pendulum is again in the foam, at t_5 it has achieved a new maximum θ after its second bounce. This pattern continues until the pendulum comes to rest, at which time θ and h will again be 0.

FIG. 3—Typical data of the modified rebound pendulum (time recorded in seconds below each graph).



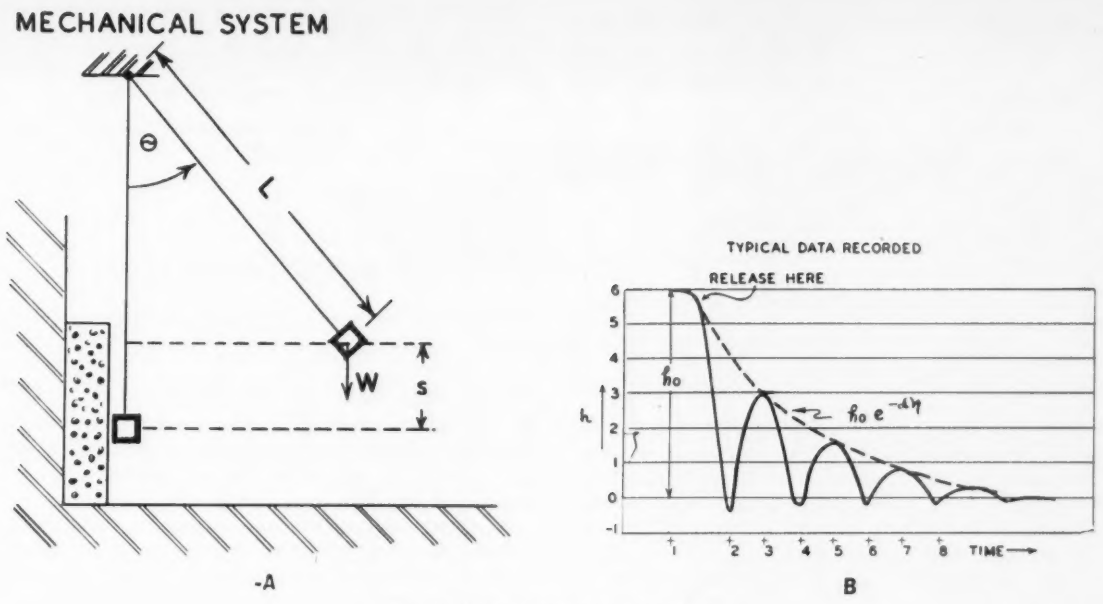


FIG. 4—Idealized system and recording.

The potential energy E of the pendulum is given for all θ's greater than or equal to 0, by the expression

$$E = W\,L\,(1 - \cos\theta)$$

The general Maclaurin series expansion for the cosine is

$$\cos\theta = 1 - \frac{\theta^2}{2!} + \frac{\theta^4}{4!} - \frac{\theta^6}{6!} + \ldots - \ldots$$

If the higher order terms are neglected,

$$\cos\theta \simeq 1 - \frac{\theta^2}{2}$$

(true within 2% for $\theta < \frac{\pi}{4}$ as will always be the case)

and

$$E = W \cdot L\,\frac{\theta^2}{2}$$

since

$$h = k\theta$$

$$E = W \cdot L\,\frac{h^2}{2k^2} = k'h^2$$

where k' is a new system constant.

At those times when the velocity of the pendulum is zero, i.e., at the peaks of the recording of θ, such as at t_1, t_3, t_5 in Figure 4b, the total energy of the pendulum is equal to its potential energy, so that by noting the heights of the voltage peaks h_1, h_3, h_5, the total energy of the system is known at various times. Resilience ρ or percentage rebound can then be readily calculated:

$$\rho = \frac{E_b}{E_a} \times 100$$

where E_a = Energy of the system before the bounce, and
E_b = Energy of the system after the bounce.

Then in Figure 4b

$$\rho = \frac{E_3}{E_1} \times 100 \text{ for energy } E_1 \text{ applied}$$

and

$$\rho = \frac{E_5}{E_3} \times 100 \text{ for energy } E_3 \text{ applied.}$$

But $E_1 = WL\,\frac{h_1^2}{2k^2}$, $E_3 = WL\,\frac{h_3^2}{2k^2}$ etc., so that

$$\rho = \frac{h_3^2}{h_1^2} \times 100 \text{ for energy } E_1 \text{ applied,}$$

$$\rho = \frac{h_5^2}{h_3^2} \times 100 \text{ for energy } E_3 \text{ applied.}$$

The value of the k, W and L can be determined from the apparatus and absorbed in k'. Figure 5 gives typical values of resilience at various energy levels for several foams. The liveliness of rubber, the deadness of polyurethane, with the vinyls in between, are clearly evident. Most of the materials become more resilient with the smaller applied energies and the accompanying smaller deformations. Rubatex vinyl foam, a very stiff material, is a notable exception. Nonlinearity in resilience is due to the complex damping mechanism in a foam material.

It is observed that the envelope or curve connecting the energy maxima is somewhat exponential in shape. If resilience ρ is constant, then the energy after a bounce is a fixed percentage of the energy before the bounce, or mathematically

$$\frac{E_n}{E_{n-1}} = \left(\frac{h_n}{h_{n-1}}\right)^2 = \rho \quad \text{(assumed a constant)}$$

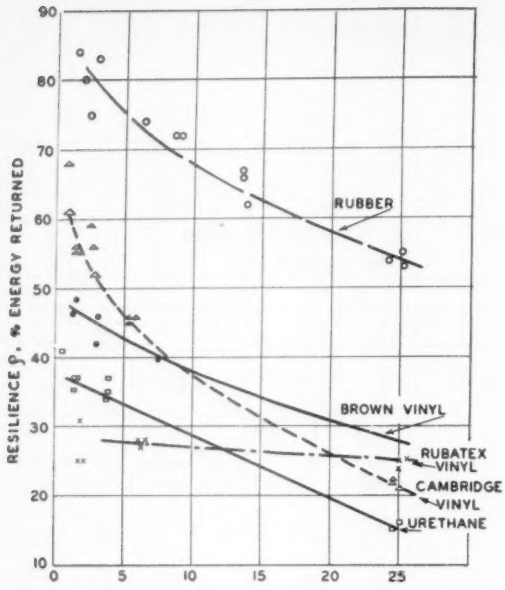


FIG. 5—Observed resilience versus relative energy applied.

This idealized material (constant ρ) would have an envelope of the form

$$h_n = h_o e^{-\alpha n}$$

where n is the number of bounces encountered. The exponent α includes the resilience and other constants and can be thought of as a modified resilience or damping factor. None of the materials tested showed a constant α. The use of semilog plots (i.e., log h_n vs. the bounce number) may possibly be a convenient way to compare materials in future studies.

Dynamic stiffness can be read directly off the recording for any energy level. The negative (in foam) displacements can be used directly as arbitrary units or calculated back to any convenient dimension by knowing the h_o value, θ_i and L. Now energy, velocity, and pendulum shape will enter the interpretation. For the pendulum employed, which was a flat 2-inch diameter lead disc, the deflections were observed based on the same energy input (hence, same velocity of impact). These data are tabulated in Table I.

TABLE I—RELATIVE COMPRESSION

(Applied energy the same for all materials.)

Material	Relative Compression (Arbitrary Units) Data Set # 1	Data Set # 2
Foam rubber	7.0	7.0
Cambridge vinyl foam	5.0	5.0
Brown vinyl foam	4.0	4.0
Polyurethane foam	4.0	3.5
Crest vinyl foam	3.5	3.5
Rubatex vinyl foam	.5	<.5

It would be possible to study the sensitivity of stiffness to velocity and/or energy by examining a series of continuous bounces. Similarly, the shape of the pendulum will affect the apparent stiffness and might also affect the resilience.

Table II lists the materials used in these exploratory tests and some of the dimensions and descriptive data.

Conclusions

The apparatus described is simple in concept and application. It supplies a great deal of data, particularly resilience and dynamic stiffness, since it evaluates several rebounds of a pendulum. Like all tests, it requires standardization in procedures. It is suggested as a tool for future foam studies and may prove to be a substantial extension of existing tests.

ACKNOWLEDGMENT

The authors wish to acknowledge with thanks the aid of George Holzwarth, laboratory assistant, who carried out the work described in this report.

TABLE II—FOAM MATERIALS

Designation	Manufacturer	Total Thickness (Inches)	Coring	Surface	Comments
Brown vinyl foam	Brown Rubber Co.	1¾	Cored	Skin	A stiff material used for bus seats.
Cambridge vinyl foam	Cambridge Rubber Co.	1⅝	Cored	Skin	Fairly soft subway seat material.
Crest vinyl foam	Crest Chemical Co.	1⅝	Uncored	Skin	Only chemically blown vinyl used. Stiffness very much a function of rate of compression.
Rubatex vinyl foam	Rubatex Division, Great American Industries, Inc.	1⅝	Uncored	No Skin	Very stiff material.
Foam rubber		2	Uncored	Skin	Purchased from Sears-Roebuck and Co.
Polyurethane	Monsanto Chemical Co.	1⅜	Uncored	No Skin	Sent as thin sheets used as packing material.

A system for Reducing Fire Hazard in Rubber Dust Collecting

By EDWARD M. DICKINSON
Plant Engineer,
Garlock Packing Co.,
Palmyra, New York

Equipment design has provided the answer to a long-standing problem associated with rubber grinding

RUBBER grinding has long been the source of nuisance fires in existing exhaust systems. Many types of dust collecting arrangements have been designed in an effort to reduce lost time accruing from these fires. All employ special devices to extinguish or contain fires and to facilitate the removal of burning rubber masses. A new exhaust system, designed by The Garlock Packing Co., Palmyra, New York, has been successfully used for more than two years without a serious fire, and it has virtually eliminated downtime and labor loss due to ductwork fires (Figure 1).

The new system represents a radical design departure from previous systems used on high speed rubber grinding. The principles employed in the new exhaust system do not prevent rubber fires. They do, however, reduce the possibility of burning occurring within the ductwork, and they simplify internal fire control.

The high speed grinding of modern rubber compounds presents a special problem to designers of dust collecting systems. Many of these compounds are known as "hot rubbers" because burning takes place almost immediately upon contact with the grinding wheels. The capture velocity of the air entering the grinding hood is necessarily high. The high velocity of the fine, soft and often hot rubber particles tends to deposit build-up at critical points of air direction change. In conventional systems, elbows or the main duct surfaces opposite the branch entry points are usually areas of greatest build-up.

When fires start at these points, it is necessary to halt production, extinguish the fire and remove the troublesome deposit. Many systems employ elaborate combinations of baffles or dampers to isolate the fire, then they flood the section with water spray, steam or carbon dioxide. These measures, while effective for the most part, usually present an additional delay period to allow ductwork to thoroughly dry, preventing further build-up of dust on wet surfaces.

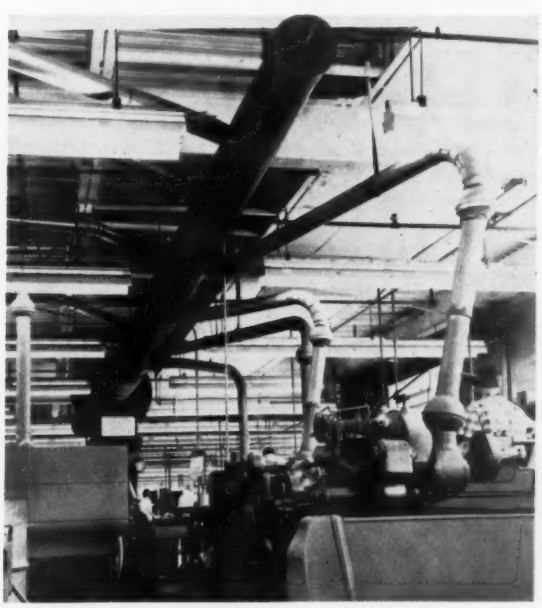


FIG. 1—The new exhaust system for collecting rubber dust as seen in installation.

Solution through Equipment Design

Garlock's solution to these problems is the use of a truncated cone as a main duct in which a cyclonic air action is induced. This design, coupled with special quick-disconnect sleeves at the first elbow past the grinding wheel hoods in the branches, has proven exceptionally efficient (Figure 2).

Cyclonic air movement is accomplished by introducing each of the branch pipes tangent to the top or bottom of the main duct (Figure 3). The branch pipes are arranged to enter horizontally and at a 30° angle to the axis of the main duct. The tangential arrangement of pipes and the acute angle of their entry in the direction of air flow, impells the air around the inner circumference of the main duct with a spiral action. The direction of air rotation is coincident with the fan blade rotation.

The efficiency of the system is dependent upon the continuous cone design of the main duct. Conventional exhaust design principles are based upon calculations to produce constant duct air velocities which preclude fallout or deposit of dust in low velocity areas. Basically, these principles state that the main duct is to be increased in area by an amount equal to each added branch plus 20%. The increases are

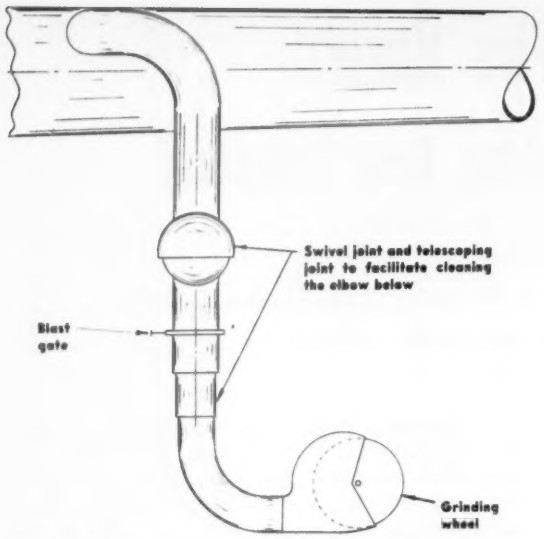


FIG. 2—Schematic diagram of one branch as it connects the grinding wheel and main air duct.

accomplished by a reducer transition of a calculated length dependent upon the main duct diameter. Because of the cylinder and reduction section construction, sudden changes in air velocities and direction sometimes are unavoidable.

For instance, a system containing many branches will often employ the use of blast gates in branch pipes that can shut off branches to idle equipment. Closing blast gates causes a drop in air velocity in the main duct at the juncture of the branch pipe. Abandoning or adding branches to main exhaust ducts may also seriously impair the efficiency of the system and create conditions which make duct fires unavoidable.

Flexibility of the System

The efficacy of utilizing a continuously tapered cone, as in the Garlock-designed system, is that any branch may be added, relocated or removed without radically misproportioning the main duct, provided the added branch enters the main duct at the appropriate cross-section area. As in conventional systems, the tapered main duct system experiences changes in air velocity when branches are added, removed, capped or throttled by blast gates. However, velocity changes are constantly controlled by the uniform pitch of taper of the main duct. This is in contrast to the abrupt changes inherent in conventional systems which contribute to fallout.

The cyclonic air action also employs the air and conveyed particles in a sweeping action to keep the main duct clean. As in any exhaust system, long duct runs are avoided, and entering branches are spaced within three to five feet of each other. The exhaust fan is located as close to the end of the branches as is practical, and the cyclone and the enclosed dust bins are placed out-of-doors. Burning particles are conveyed out of the building where they are easily extinguished. The plant layout department works closely with the maintenance department when locating grinding equipment so that optimum efficiency can be obtained from the exhaust system.

State labor departments and insurance companies insist that fire extinguishing devices be incorporated into dust collecting systems. Garlock installs an

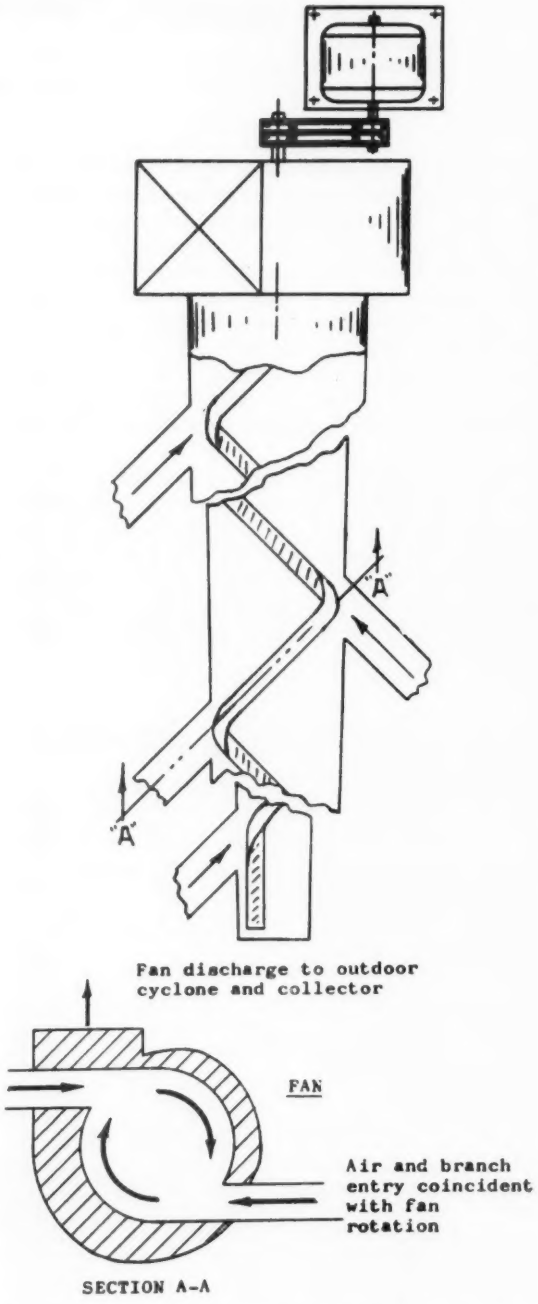


FIG. 3—Cyclonic air action achieved in the main duct by introducing each of the branch pipes tangent to the duct.

ordinary open-sprinkler head in the small end of the main duct. The sprinkler head passes through an end-cap fitted into the duct. This cap can be pulled back along the pipe for duct inspection.

A second opening in the duct cap allows air to enter and keep the end of the main duct clean. Should a fire occur, the fan is left running to draw the water from the sprinkler head through the duct. This smothers and dislodges the burning mass quickly. The spiral action of the water droplets and the air keeps the fired particles separated and moving, thereby preventing agglomeration.

Conventional methods of calculating air duct velocities were used in designing the tapered main duct system. The top or the center line of the tapered main duct is horizontal, allowing water to flow toward the fan. The main duct is connected to the fan housing with a draw band to facilitate cleaning.

A Steam Trap for

Reducing Downtime and Increasing Production on Vulcanizers and Molds

IMPROVEMENT in production performance and reduction in down time for its molding presses and vulcanizers has been reported by Stokes Molded Products, Trenton, N. J., since installation of Sarco Thermo-Dynamic steam traps. Stokes manufactures hard rubber storage battery containers and parts.

An important step in the Stokes process of making the molded rubber battery containers and parts is the curing of finished products in vulcanizers heated by steam at 60 psi. Skidloads of finished parts are trucked into chambers 30 feet long and six feet in diameter, as shown in the accompanying photograph, and left under heat and pressure until curing is complete. Eleven of these vulcanizers are operated on a continuous basis.

The steam traps used originally used on these vulcanizers failed to provide the continuous performance demanded by the curing process. Downtime would average one to two hours at least every two weeks for cleaning and at least every two months it was necessary to make a complete replacement. Interruption of operation, of course, meant production loss.

In April, 1954, Stokes, in an effort to cope with this production problem, installed a one-inch Sarco Thermo-Dynamic steam trap, manufactured by Sarco Co., Inc., New York City, on the outlet side of one vulcanizer. It was preceded by a Sarco strainer, as recommended by the company.

Improvement in performance is reported to have been immediately apparent. Temperature was held within critical range, and maintenance shut-downs were reduced to a minimum. E. Edgar Trembley, lead engineer at Stokes, states that this trap remained in continuous use for three years, with the only downtime being for strainer cleaning about once every six months.

As a result of the success obtained with the test installation, Mr. Trembley had Sarco TD traps installed on three vulcanizers in the plant. Performance has been continuous, downtime has been cut to a minimum, and production has been maintained uninterruptedly, he reports.

A workman loading a vulcanizer-curer at Stokes Molded Products. Steam pressure, used to cure the skidload of finished products, is maintained at 60 psi.

Mr. Trembley has also applied the Thermo-Dynamic trap to hydraulic press operations. He says that the installation permits a more even distribution of heat throughout the heated portions of the cases and molds and has cut down necessary curing time. As a result he now uses only TD traps for these installations, and will replace original steam traps with Sarco TD traps as maintenance requirements demand.

Special Industry Report

Use of Company-Owned AIRPLANES in the Rubber Industry

BUSINESS flying has been growing faster than any other category of general aviation over the past years, and there is every indication that this growth is going to continue. What are the reasons for this expanding use of company-owned business aircraft? The obvious answer which comes to mind is the saving of valuable time by executives and salesmen, plus the flexibility of scheduling and routing which results in more frequent calls at locations that are more or less inaccessible by other means of transportation.

A survey recently conducted by RUBBER AGE shows that in the rubber industry these are indeed foremost among the reasons why the privately-owned business plane has been adopted by many of its members. The editors, feeling that this new trend has now become an established pattern throughout industry, checked the leading rubber manufacturers and their materials suppliers to see if they too have adopted the company-owned plane as a means of improving operating efficiency, and if they found its advantages applicable to the problems of the rubber industry. The answer is, for most of the larger companies at least, that they have and they do.

All the rubber companies which do use their own airplanes for transporting their executives and salesmen agree that the expense and trouble involved are compensated for by advantages gained. Significantly, none who were approached reported trying their own company-owned and directed service, and then abandoning it. All are in accord that the speed, convenience and flexibility of scheduling provide a valuable asset in attaining a smooth-running business, and that today it has become common psychology to accept company-operated craft as another of the many business tools needed in everyday operation.

Some of the companies queried emphasized that the utility of this type transportation is becomfng more and more practicable as a result of the current industry trend toward diversification, the scattering of plants in different sections of the country, so that both executives and salesmen are more and more being called upon to go to places which are not served by regular commercial airlines.

Most of the firms approached agreed that the cost is higher than that of using commercial airlines, but still think that owning their own craft is an economically sound policy, the extra expense being more than compensated for by the advantages already listed. One of the largest materials suppliers to the industry commented as follows: "There is no question but what the cost of this method of transportation is higher than that of the scheduled airlines or railroads. We do feel that the added speed and convenience do compensate for the extra expense involved."

There is, however, some divergence on the point of economics. Consider for example this statement from another large company: "We find it especially helpful for out-of-the-way places not easily reached by other means of transportation and the advantages of convenience and speed compensate for the extra expense involved. In fact, if we fill the plane we find that when everything is considered it probably costs less than other transportation."

This last viewpoint, however, is applicable only to the large company which moves so many of its personnel that it, in a sense, operates its own internal airline. Certainly, for the medium-size or small company operation of its own craft is not a question of economics but the necessity for rapid, flexible communication.

Who Should Buy?

This then raises the following question: How does a company determine if it can profitably operate its own plane? To answer this one correctly requires a great deal of complex analysis, and evaluation of various interrelating factors, such as, for example, average amount of travel and value of executive time. The fact that most of these either fluctuate from month to month or are abstract in nature does not facilitate a definite answer. For the typical firm, operation of its own plane, no matter how low the original purchase price, with attendant expenses such as rent of hangar space, maintenance, pilot's wages and insurance, is a step not to be lightly undertaken.

Aero Design & Engineering Co., Oklahoma City, Oklahoma, has come up with a technique, called Time Travel Analysis, for determining if airplane ownership for a company is a sound investment. It involves six steps, which are:

(1) To determine the per hour value of executive time.

(2) To tabulate elapsed time and per mile costs of management trips during a selected period of time.

(3) To project the time used and the money cost of similar travel by company airplane.

(4) To determine possible savings of valuable executive time.

(5) To determine the total of all costs of actual trips.

(6) To compare the total of all costs with a cost projection for company aircraft.

A point to watch in making such evaluations is the distinction between cost of time saved and value of time saved. An executive whose indirect overhead, expense account, secretary salary and direct overhead are taken into account will generally cost the firm about two or three times his actual salary. The validity of the calculations, of course, depends on the accuracy with which the various points can be estimated. And final figures must be based on an adequate testing period.

If the company does decide to purchase its own plane, it will find a variety of models in many different sizes available from the various airplane manufacturers. It is simply a matter of comparative shopping to see which offers the features most suited to the individual needs of the company.

The company-owned airplane has been accepted by the rubber industry as another of the organization tools necessary for doing business in the most efficient way possible.

The price will probably range from anywhere in the $10,000 area to as high as the purchaser wishes to go. Most models recommended for business fall in the $25,000 to $125,000 bracket. And, if the company can fulfill its needs with a simple, two-passenger plane, it may get by for considerably less than $10,000.

Advantages for the Small Company

Even though a company has made comparative evaluations of commercial versus self-owned transportation, it may still be hesitant about the plunge with the actual purchase. This is especially true of the small company, which may realize the economies saved in executive time when the plane is operating, but may doubt its advantages in view of the small executive or sales staff which is to use the plane. Actually, just because the staff is small such a company may use its own plane to best advantage. Generally it is in the small organization that the president or other highly placed personnel will more likely be out in the field personally attending to problems or seeing about orders. And it is for these people that the most efficient utilization of time is a necessity.

The economic advantages in this situation are even more feasible if the executive involved can fly himself. This eliminates the pilot's salary, and also indicates purchase of one of the smaller and therefore less expensive ships. In addition, since modern design and the development of various control and safety instruments, much of the daring has been taken out of piloting, so that it is perfectly conceivable that the businessman can today double as his own pilot.

A development which is becoming more and more prevalent is the leasing of business aircraft. Organizations which only occasionally need a plane, or find the need to add to their available machines for some particular purpose for a specified time, often find it to their advantage to rent. As most leases carry an option to purchase the plane under terms designated in the contract, many firms use such an arrangement until they decide whether or not ownership is a sound step. Lease arrangements differ widely to fit varying conditions, and with the policies of the leasing company.

Insurance

One of the "hidden" expenses which a company must figure in when it evaluates the cost of operating its own plane is the effect on rates of group insurance. In this day when most companies carry this type protection for their employees, from the president down to the janitor, the rate for each individual, whether he flies or not, may be raised, thus appreciably affecting the total cost of the policy.

The responses of the insurance companies when questioned on this problem have been varied. One of the largest ones says that at the present time it takes no notice of company-owned planes on its regular group insurance for 25 or more employees. On special plans covering less than 25, however, the amount of flying time for the individual employees is determined. Flight exposure is converted into established debits which are compared to premium income. The company also reserves the right to reduce coverage or decline to insure those whose aviation exposure exceeds established tolerance levels.

Another company reports that its group insurance covers travel by executives in commercial aircraft if the firm requests this coverage. Inclusion of such a clause, however, for travel in private aircraft raises the premium for non-traveling individuals on the policy significantly. This company advocates for premium purposes a basic group policy for all employees, and individual air travel insurance for those who specifically need it.

Still another insurance company, commenting on its group travel accident insurance, says that rates are based on the amount of exposure to hazards—and that a trip via private or corporate-owned aircraft is considered more hazardous than a similar trip on a scheduled airline. In addition, the former method of travel often presents the insuring company with a catastrophe hazard by reason of several executives of a corporation riding in an airplane at the same time whereas they would be less likely to do this on a commercial flight.

Despite this and similar questions which individual companies must investigate and solve for themselves, and despite the obvious expenses involved—not only initial investment, but other costs such as maintenance, fuel, rent for hangar space, insurance and salary for pilot—there is no question that the company-owned airplane has been accepted as another of the company tools necessary for doing business in the most efficient way possible. Already most of the large companies—in industry as a whole and in the rubber industry—are operating their own planes. Many of the not-so-large companies are also finding this type transportation to their advantage, if not with multi-passenger craft flown by full-time pilots and scheduled by a regular traffic office, at least with the smaller planes, possibly flown by the traveling executive or salesman himself. When a business practice pays off, as this one has, its continued use is insured.

EDITORIAL

Congratulations—Well Done!

► The natural rubber industry is to be congratulated for steps it has taken in past weeks—steps which will be of inestimable value to consumers all over the world. As reported elsewhere in this issue, Malayan rubber producers have announced a $3.5 million appropriation. This money will be spent in an expanded research and development program aimed at bettering production methods and in furnishing technical service to consumers. In addition, the Malayan Rubber Board has appointed Sir Geoffrey Clay as Chief Controller of Rubber Research and Chief Executive Officer of the Malayan Rubber Fund Board. In this capacity, Sir Geoffrey will direct programs aimed toward the production of sufficient quantities of natural rubber at prices competitive with synthetic. (An exclusive interview with Sir Geoffrey appears elsewhere in this issue.)

Many persons active in the rubber industry throughout the world have been convinced that the natural rubber segment, beset by many problems, should take steps to insure its future position vis a vis synthetic rubber. The natural rubber producer is, in many cases a victim of circumstances—circumstances involving the political situation—stockpiling procedures—prices. On this latter point, Sir Geoffrey makes an interesting observation. "Price," he notes, "is a function of the market and not a function of the producer."

It will be seen then, that the natural rubber producer, in large measure, does not control his own destiny. In those areas in which he does have a determining voice, areas concerned with volume of production, quality of production, and service, he has now chosen to expand and accelerate his activities.

The Malayan rubber producer is convinced that the future holds a profitable place for both natural and synthetic rubber. He is of the opinion that natural rubber will continue to find use as a general purpose polymer. The measures he has undertaken during the past few weeks should do much to insure his place in the market.

It is a healthy thing for an industry to recognize that there are areas calling for improvement. And it is an intelligent thing to take positive action to overcome any shortcomings which may exist. The Malayan Rubber Fund Board is to be congratulated, and we extend to Sir Geoffrey our wishes for success in his new complicated task.

NEWS REPORTS

and industry activities

AUGUST, 1959

ASTM Committee D-11 Holds Meeting

Subcommittee Reports · Technical Papers · Marburg Lecture

Award to Kimmich · New ASTM Officers · New Committee D-27

► Committee D-11 on Rubber and Rubberlike Materials of the American Society for Testing Materials held its annual meeting on June 26 at the Chalfonte-Haddon Hall in Atlantic City, N. J., in conjunction with the 63rd annual meeting of ASTM, held on June 21-26. D-11 subcommittee meetings were held in the morning and afternoon on June 23, 24 and 25. ASTM presented its Award of Merit to E. G. Kimmich, chief engineer of industrial products design for the Goodyear Tire & Rubber Co. The award was made at the President's Luncheon on June 23, in recognition of distinguished service to ASTM.

On June 23, Herman F. Mark (Polytechnic Institute of Brooklyn) gave the Marburg Lecture on "New Polymers—New Problems." This annual lecture is a memorial to the first secretary of ASTM and was established to emphasize the importance of furthering the knowledge of properties and testing of engineering materials. Prof. Mark stated that during the last few years new catalytic systems have been discovered and new methods of polymerization have been developed which permit the preparation of many organic polymers with a much higher degree of molecular regularity than has been possible hitherto.

He pointed out that some of these new materials have already found interesting and meaningful applications, while others are just now being investigated in respect to their most profitable and promising uses. However, Prof. Mark continued, besides their immediate or pending practical applicability, these highly ordered macro-molecules have also posed new fundamental questions of nomenclature, classification and characterization. They force us to widen our scope and to expand the basic framework of polymer science in order to permit an adequate description and interpretation of all the data assembled within the last few years, he stated.

D-11 and D-20 Meet Jointly

A joint meeting of Committees D-11 and D-20 was held on June 25, at which two technical papers were given. Markus Royen (Apex Tire and Rubber) discussed "Improved Oven Design for Accelerated Aging of Polyvinyl Chloride" and Norbert Mueller (DuPont) spoke on "The Effect of Die Closure Pressure on Mooney Viscosity Determinations."

Mr. Mueller remarked that the Mooney viscometer is a common sight in almost all rubber manufacturing plants, and many processes and materials are accepted or rejected with the values obtained from this viscometer. The machine's largest limiting factor, when studying high viscosity polymers, Mr. Mueller stated, is the reproducibility between viscometers, even though each machine at a given adjustment will reproduce itself over the complete range to an accuracy of about ±2 per cent. He pointed out that the major reason for large differences between machines is attributed to the adjustments of the Mooney machine itself. The closing pressure varies due to these adjustments and is the most critical influence of Mooney results.

Mr. Mueller then discussed several tests that had been made in adjusting die closure and presented slides which showed the results obtained. In summary, Mr. Mueller stated that it was found that a holding force is not important in the viscosity range below 75, however, the reverse is true for high viscosity material. He pointed out that below 750 pounds of total force, the viscosity drops rapidly with a small reduction in force, and suggested that a holding force greater than 750 pounds be considered by ASTM. Mr. Mueller informed the joint group that the limited study conducted on the closed die versus vented die points to some interesting and unexplained phenomena that warrants additional investigation, and plans are underway to examine this more closely in scorch tests as well as viscosity measurements.

At the D-11 annual meeting on June 26 it was announced that plans for the meeting of ISO/TC 45 on Rubber, in New York from October 26 through October 31, are well under way. Meeting headquarters will be at the Henry Hudson Hotel and the plenary sessions and meetings of the working groups will be held there. It was also announced that a banquet for foreign and American delegates will be held on Thursday evening, October 29. This six day meeting is being sponsored by

Over 60 persons attended the ASTM Committee D-11 dinner held on June 25 at the Chalfonte-Haddon Hall in Atlantic City, N.J., during the 63rd Annual Meeting of the American Society for Testing Materials.

Committee D-11, through the American Standards Association. D-11 also stated that it is cooperating with the Rubber Division of the American Chemical Society and the Rubber and Plastics Division of the American Society of Mechanical Engineers, in sponsoring the International Rubber Conference, which will be held on November 8-13 in Washington, D. C.

Simon Collier, chairman of D-11, informed the committee that a Steering Committee on Joint Sealants had met on June 10 in Philadelphia, Penna., at the request of ASTM, for the purpose of discussing the formation of an active group on elastomeric joint sealants for the building industry. Representatives from several ASTM committees and from various industries attended the session. The Steering Committee felt that the formation of a new committee would best serve the industry and its needs, and proposed that the committee be known as Committee D-27 on Elastomeric Sealants.

The scope of the new committee would be "To develop test methods, classifications, nomenclature and performance specifications for elastomeric sealing materials for use by the construction industry for sealing joints. Typical sealants include elastomeric caulking and glazing compounds and preformed gaskets and tapes."

The following slate of officers for the new committee was drawn up by the Steering Committee: *President,* Wayne Koppes (Architectural Consultant); *Vice-President,* R. Humke (Minnesota Mining & Manufacturing); and *Secretary,* J. R. Panek (Thiokol).

At a Steering Committee meeting scheduled to be held late in August, it is expected that a chairman for the Polysulfide Subcommittee will be selected. This group will be involved in the improvement of performance specifications developed by the Building Trades Specification Committee; the Rubber and Plastic Adhesive and Sealant Manufacturers Council; and the National Association of Architectural Metal Manufacturers. A meeting of the new committee is planned for the week of September 10 in Chicago, Ill.

New officers of the American Society for Testing Materials were introduced during the annual meeting. They are: *President,* F. L. LaQue, vice-president and manager, Development and Research Division, International Nickel Co., Inc.; *Vice-President,* M. N. Clair, president, Thompson and Lichtner Co., Inc.; and *Directors,* A. B. Cornthwaite, engineer of materials and tests, Department of Highways, Commonwealth of Virginia; C. L. Kent, assistant director, Technical Services, Jones & Laughlin Steel Corp.; H. C. Miller, laboratory engineer, Testing Laboratory, Public Service Electric and Gas Co. (N. J.); C. F. Nixon, head of Electrochemistry and Polymers Department, Research Laboratories, General Motors Corp.; H. D. Wilde, research coordinator, Humble Oil and Refining Co.; I. V. Williams, materials engineer, Bell Telephone Laboratories, Inc.; and R. D. Thompson, chief development engineer, Taylor Instrument Companies.

Reports from the different D-11 subcommittees which met during the annual meeting follow herewith:

Subcommittee 4—Protective Equipment for Electrical Works (Gordon Thompson, Electrical Testing Laboratory, Chairman): The chairman submitted the results of letter ballots to D-11 and then moved that: Tentative Specifications D1048-49T — Blankets, D1049-49T—Hoods, and D1050-49T—Hose, be advanced to standard specifications with their present texts; Tentative Specification D1051-49-T—Sleeves, be advanced to standard specification with the editorial change of substituting "proof-test current" for "leakage current" and the text for "workmanship and finish" to that proposed for D-120; Tentative Specification D120-52T to be continued as a Tentative Specification D120-59T with the changes in text which had received the favorable ballot 16-to-2 plus the 6 favorable and 1 opposing ballots of the advisory group. Any limit for d-c proof-test current will be omitted at present; Tentative Specification D-59T for Low-Voltage Gloves to be adopted as a tentative specification using text submitted to our ballot, with the 750-volt limit of use in the scope. Action in the American Standards Association will be taken after the meeting of D-11 on June 26.

Subcommittee 5—Insulated Wire and Cable (C. H. Seaberg, General Electric Corp., Acting Chairman): The subcommittee considered the single negative vote on the D-11 Letter Ballot pertaining to "Specification for Synthetic Rubber, Heat and Moisture Resistant Insulation for Wire and Cable 75C Operation" in respect to the maximum values for dielectric constant and the gravimeter method of moisture absorption. It was moved, seconded and passed that the subcommittee reaffirm its action at the February meeting. This means that the values in the letter ballot stand.

The negative vote on items 1 and 2 of the Subcommittee 5 letter ballot of April 28, 1959 was withdrawn. It was moved, seconded and passed unanimously that all items of this letter ballot be balloted in D-11 and submitted to the Administrative Committee on Standards so that they may be included in the forthcoming D-11 Compilation. Subcommittee 5 is continuing the cooperative work with the D-11, D-20 task force on oven aging of plastics. The information section presented revisions of Specifications D-1351 for polyethylene and D-1352 for butyl insulations to bring them up to date with current practice and also a new specification for Black Polyethylene Jacket.

It was moved, seconded and passed unanimously to adopt the revised and the new specifications and have them letter balloted in Subcommittee 5 and D-11 and submitted to the Administrative Committee on Standards so that the revisions and the new specification may be included in the forthcoming D-11 Compilation. A motion was passed to pass the specification section bringing Construction Specification D-1350 up to date with current practice. The scope will remain the same.

Subcommittee 6—Packing (R. F. Anderson, B. F. Goodrich Co., Chairman): Simon Collier (Johns-Manville) reported that a need for a specification covering molded rubber gaskets for asbestos cement pipe had developed. Mr. Fenstermacher (Keasbey and Mattison) circulated a draft of a proposed specification covering such service. The committee felt that the possibility of combining an asbestos cement pipe gasket specification with the concrete pipe gasket specification should be explored. A task group headed by J. W. Axelson (Johns-Manville) was established. Other members of the group are R. K. Fenstermacher (Keasbey and Mattison); R. F.

Tener (National Bureau of Standards); M. G. Schoch (Hewitt-Robins) and M. J. Clark (Goodyear). This group will present recommendations for a proposed specification covering molded gaskets for asbestos cement pipe to the subcommittee.

Mr. Fenstermacher reported for the working group on recommendations for the proposed specification on rubber gaskets for concrete sewer and culvert pipe. A table summarizing the requirements of a draft of a similar federal specification issued by the National Bureau of Standards was distributed. The committee voted that the following recommendations be passed on to Committee C-13 in regard to the concrete pipe-gasket specification; these properties had been held in abeyance at the February meeting pending further study: (a) Original tensile—1200 psi, minimum; (b) Original hardness—three ranges: 40±5, 50±5, 60±5; (c) Oven aged—Conditioned 96 hours @ 158°F., Tensile loss—15% maximum, Elongation loss—20% maximum; (d) Tolerances—Class 3, Commercial of RMA.

The desirability of obtaining hardness readings directly from the molded gasket was discussed. D. S. Messenger (Garlock), reported that the O-ring group in Tech A was already studying this problem. He is to report to the committee as to the results of this study. Mr. Kapps (F. D. Farnum) reported on the work in Section X of Tech A on Stability, Stress Relaxation, Dimensional Stability, and Corrosion. A status report on the findings of the study group for the industry opinion survey on gaskets and packing was given by Mr. Kapps. The final report may be expected by the next meeting.

Subcommittee 7—Rubber Latices (G. H. Barnes (Goodyear Tire & Rubber Co., Chairman): The subcommittee was in complete agreement that BSI proposal C2 (RVC) 4435, on Determination of Density of Latex, be submitted for the present ASTM D1076-57T Density Test. Authorization was given to a representative to make minor changes at the forthcoming October meeting of ISO in New York City. Submission of this method will be made to the subcommittee by letter ballot following the ISO meeting. The chairman reported that the subcommittee was in agreement with ISO on the VFA method so that an agreement will in all probability be reached at the coming meeting. A study is being made relative to reducing the present KOH number and a report will be made at the next annual ASTM meeting. A specification limit for VFA number is being investigated by a task force and a recommendation will be made at the next annual meeting.

A method for the determination of boric acid was agreed upon. This method applies specifically to low ammonia latex preserved with boric acid and it is to be used for determining the KOH correction factor. The method was not proposed for inclusion in ASTM D-1076 pending wider use of this type of latex. A task force has been established to determine a more practical method for measuring viscosity. Data will be presented at the next annual meeting. Two typographical errors in ASTM 1076-57T were called to the attention of the subcommittee. (1) Page 584 Section 35 (VFA number) the DRC for centrifuged latex in table should be changed from 62.0 to 61.0; (2) Page 577, Section 14 (KOH number), line 7 following the table different should be changed to "difference".

IRC to Feature Exhibit

► International Rubber Conference has announced that, for the first time, an exhibit will be held in conjunction with the conference, which will take place from November 8 to 13 in Washington, D. C. Exhibit booths will be erected in the Main Ballroom of the Shoreham Hotel which, jointly with the Sheraton Park Hotel, is headquarters for the meeting. For the convenience of exhibitors, exhibit hours have been restricted to periods of maximum traffic. Exhibits open at 9 a.m. daily starting Tuesday, November 9, and close at 5 p.m., with the exception of Friday, when the exhibits will be open from 9 a.m. to 12 noon. Exhibit space is limited to 41 booths. Those interested may write to Norman Bekkedahl, Room 207, Material Testing Building, Bureau of Standards, Washington, D. C.

Subcommittee 8—Nomenclature and Definitions (R. G. Seaman, Rubber World, Chairman): H. G. Bimmerman (DuPont), chairman of the task group, reported the results of the latest ballot circulated to the members of Subcommittee 8 on the most recent proposal for definitions of rubber, rubberlike and rubber products. Of the 21 votes returned 16 were affirmative, 4 were negative and 1 did not vote. The reasons for the negative votes were read and discussed but were not completely resolved. The task group's proposed definitions were then read with the object of obtaining a majority vote, if possible, on as much of the definitions as possible for another letter ballot in the subcommittee.

R. D. Stiehler (National Bureau of Standards) proposed that rubberlike should be defined first, then rubber, and then rubber products in order that the broadest range of materials could be identified first, followed by the narrower group, and then the products. A motion to this effect was made by A. E. Juve (Goodrich) seconded and passed and the subcommittee began reconstructing the definitions. Definitions for rubberlike, rubber, rubber products and a quantitative extension-retraction test to identify rubber after processing and modification as it exists in rubber products were developed. A motion was made, seconded and passed to submit these definitions to individual letter ballot first in Subcommittee 8 and, if approved, then in Committee D-11 for inclusion in D1566-58T, Definition of Terms Relating to Rubber and Rubberlike Materials.

The chairman of Subcommittee 8 was authorized to appoint three members of the subcommittee, including himself, to serve on a coordinating committee with the subcommittee chairman on nomenclature and two other members of this subcommittee of Committee D-20 in Plastics to resolve the conflict between ASTM D1418-58T of D-11 and ASTM D1600-58T of D-20 on coding and identification of elastomers and rubbers. The chairman of subcommittee will appoint Task Group 2, authorized at the February 1959 meeting, to develop coding and identification of the "M" or polymethylene family of elastomers in D-1418-58T and eventually all of the families of elastomers for which this has not been done. The subcommittee chairman will review the present and provide future assignments of Subcommittee 8 in a memorandum to its members and request for comments in order to plan future work. Additional interested D-11 members will be invited to join the subcommittee.

Subcommittee 10—Physical Testing of Rubber Products (L. V. Cooper, Firestone Tire & Rubber Co., Chairman): The chairman first presented to the committee the fact that he had had several requests for a method to make tensile tests at elevated temperatures. After some discussion, the committee voted to empower the chairman to appoint a task group to recommend the necessary changes in D-412 to allow the tension testing at temperatures other than room temperature. Dave Scott (Scott Testers), chairman of the E-1 Task Group on Calibration of Tensile Machines, stated that the work was being started and that the scope of the investigation was being limited to machines with less than 2000 pound capacity. D. S. Messenger (Garlock Packing) in reporting for the task group on the re-writing of D-1414 on the testing of O-rings stated that the first questionnaire had been sent out but that an insufficient number of replies had been received to make a report as yet. The subcommittee, after some discussion, voted to recommend that D-1456 on Strain Testing be continued on a tentative basis for two years.

Subcommittee 11—Chemical Analysis of Rubber Products (W. P. Tyler, B. F. Goodrich Co., Chairman): The report of the task group on the reorganization and revision of D-297 and D-833 was discussed at length. This report outlines the reorganization and presents new scopes for most of the procedures. The revised methods will be written, insofar as possible, to clarify the application of the methods to natural and synthetic rubber products. Detailed rewrite assignments can now be made. Cooperative testing program results on zinc, butyl rubber and titanium determination were discussed. The results were poor and a discussion followed regarding the philosophy of testing programs, particularly with respect to the degree of experience desirable in testing a new procedure. Further immediate testing programs will be limited to testing of procedures needed to fill the gaps in D-297, especially in direct determination of synthetic rubber content of rubber compounds.

Subcommittee 12—Crude Natural Rubber (L. G. Mason, B. F. Goodrich Co., Chairman): The first half of the meeting was devoted to a detailed discussion by S. J. Pike, a rubber dealer, to acquaint the membership with the many difficult and complex problems in trying to get acceptance of specifications other than the present ones now in use as covered by International Standards. A report was given by the chairman on the status of work in his task group pertaining to round-robin tests on the Bureau of Standards Test Bale No. 385 using the chemical tests as outlined in ASTM D-1278-58T and D-297. The round-robin was not started in sufficient time to give a final report but that which has been done shows that poor agreement is in evidence on some tests and further work will have to be done on modification or interpretation of some of the procedures.

Further evidence of high manganese and copper in smoked sheets 1, 2 and 3 was brought up by R. D. Stiehler (National Bureau of Standards) on rubber purchased in the past couple of years by the Government Services Administration. High ash content on some lots of Nos. 3 and 4 Ambers was brought out in the meeting and the need for amassing more detailed information and for applying possible corrective measures. It was also suggested that action be taken by individual consumers to stop the use of talc-soapstone, etc., in and between books in the bales of Nos. 3 and 4 Ambers which is becoming more and more prevalent even though the International Types forbid such practices. L. G. Mason has been appointed to replace Norman Bekkedahl (National Bureau of Standards) as chairman of Subcommittee 12, at Mr. Bekkedahl's request.

Navy Seeks Scientists

► The Naval Air Material Center, Philadelphia 12, Penna., has an urgent need for qualified electronic scientists, metallurgists, physicists, technologists, and engineers (aeronautical, electrical, electronic, industrial, general, mechanical and power plant). The Center is currently engaged in an extensive program of aeronautical research, development, experimentation and test operations for the advancement of Naval aviation. Experimental work is also being conducted in the guided missile field. Starting salaries range from $4490 to $8330 per annum. Application for Federal Employment, Standard Form 57, should be filed with the Industrial Relations Department, Naval Air Material Center, Naval Base, Philadelphia 12, Penna. Applications may be obtained from the above address or information as to where they are available may be obtained from any first or second class post office.

Subcommittee 13—Synthetic Elastomers (B. S. Garvey, Pennsalt Chemicals Corp., Chairman): The chairman reported that sampling SBR black masterbatch procedure for future incorporation in D-1485 is under study and will be reported at the next meeting. L. G. Mason (B. F. Goodrich) submitted a status report with particular reference to method for determination of volatile content. The status of chemical tests for SBR was reported by E. J. O'Connor. A motion was passed to delete viscosity-gravity classification limits from the proposed annual report of Committee D-11, Table IV in D-1419-58T for paraffinic, naphthenic, aromatic and high aromatic oils.

A motion was passed for the chairman to appoint a task group to set up methods of tests and consider classification of oils for synthetic rubber in D-1419. The chairman indicated this task group would probably consist of two representatives each from (1) oil companies, (2) synthetic rubber producing plants and (3) rubber manufacturing companies with a neutral chairman. E. J. O'Conner and R. S. Hanmer (Phillips Petroleum) reported on results of a round-robin from five laboratories on determination of oil in oil masterbatches via extraction method. A motion was passed to submit a letter ballot to Subcommittee 13 on the proposed method for estimation of oil content in SBR oil masterbatches for future incorporation in D-11. Oil in oil-black-SBR masterbatches will also be studied.

Mr. O'Conner submitted results of round-robin tests on the color of raw polymers SBR 1703, 1712 and 4700. No action was taken but a task group will continue work to obtain best method for submission to Subcommittee 13. Physical tests and recipes for styrene-butadiene rubbers were reported by H. R. Norsworthy. Round-robin tests on the recipe in the February 6, 1959, minutes of Subcommittee 13 showed this accelerator sulfur ratio was too fast curing and therefore could not be recommended for test of SBR 1502 and 1712. The task group will continue work on the objective to obtain a suitable recipe for test of oil masterbatch 1712 and cold rubber 1502 with HAF black reference lot No. 1.

A motion was passed to submit a letter ballot to Subcommittee 13 covering seven formulae for testing styrene-butadiene rubbers for eventual incorporation into the new Table XII of D-15, which will replace the old Table II of D-15. No formulae for oil-black masterbatches were submitted at this time. The task group will continue to work and submit formulae based on 100 parts base polymer only. The task group headed by G. C. Maassen (R. T. Vanderbilt) submitted a report which was read by R. G. Seaman. Motion was passed to submit a letter ballot to Subcommittee 13 covering proposed revision of D-1419—paragraph (b) with additions for clarification of other paragraphs.

Subcommittee 15—Life Tests for Rubber Products (G. C. Maassen, R. T. Vanderbilt Co., Chairman): G. N. Vacca (Bell Telephone Labs.), chairman of the task group on "Oven Aging of Plasticized PVC and Highly Plasticized Elastomers", reported that two round-robin aging tests have been completed in ovens presumably conforming to ASTM specifications and according to ASTM procedures. Present ovens were shown to be inadequate for reproduction of results. Various air flow rates and various shelf arrangements and movements during aging did not give satisfactory results. The Royen Tube oven does give very uniform results in tests performed to date. Several companies are obtaining conversions to the Royen Tube and a third round-robin will be conducted when these are in operation. The Latham baffle system will also be included in the third round-robin.

A. G. Vieth, chairman of the task group on Ozone Testing, reported the results of a questionnaire which had been submitted to a group of companies, relative to tests and procedures in D-1149-55T. Based on the replies obtained, it was moved and passed that the rewrite of D-1149 be submitted to Subcommittee 15 for comments and criticisms prior to sending it to D-11 for letter ballot. D. J. Milnes (Ozone Research & Equipment Corp.) com-

mented that the work of this subcommittee should be coordinated with that of Tech A so that two specifications would not be produced. Mr. Vieth stated that he is a member of the Tech A Committee and will handle this situation.

Mr. Milnes suggested that work be started toward standardizing methods and procedures for dynamic ozone testing. It was moved and passed "that consideration be given to producing a dynamic ozone test procedure specification". Mr. Milnes was appointed chairman of the task group to investigate dynamic testing. Messrs. Vieth, Lawrence and Muller agreed to work in this group. Mr. Milnes will obtain others from the automotive industry to serve in this task group. J. E. Norton (Atlas Electric Devices Co.), chairman of task group on weathering, reported that the plastic chip standard is being letter balloted. A report is being prepared for publication in ASTM Bulletin. Pending approval of the above method the task group recommends that D-750-55T be retained as tentative for another year. It will be revised when the plastic chip method is adopted.

It was moved and passed "that D-749-43T be transferred to the jurisdiction of Committee E-1, Subcommittee 14." Mr. Norton reported on tests using Xenon lamps. Reproducibility at present is poor. Tests are continuing with various lamps. A. E. Hicks (General Tire & Rubber Co.), chairman of the task group on Discoloration of Light Colored Products, reported that the group has been trying to gather information and suggestions for test procedures for evaluating migration strain or discoloration. To date nothing satisfactory has been forthcoming. Mr. Hicks asked for suggestions. It was noted that Tech A is now interested in D-1206-52T and it was decided to continue this specification until a decision is reached by Tech A.

Subcommittee 16—Classification and Specifications of Rubber Compounds (J. F. Kerscher, Goodyear Tire & Rubber Co., Chairman): The subcommittee chairman reported that the task group, authorized at the February 1959 meeting of the subcommittee to work with Section IV-D-3 of the SAE-ASTM Technical Committee on Automotive Rubber in the development of the "expanded tabular system" of ASTM D-735 for rubber compounds, is to be comprised of the following members: Dr. R. D. Stiehler (National Bureau of Standards); Dr. B. S. Garvey, Jr. (Pennsalt Chemicals Corp.); C. M. Hill (Bell Telephone Laboratories); and J. F. Kerscher (Goodyear Tire & Rubber Co.). Some of the basic principles of the expanded tabular system were explained by the chairman. It provides a complete and adequate classification in two tables: first, a table listing properties that should be met by all properly formulated and vulcanized elastomeric compounds for normal use and second, a table of suffix requirements that enables the purchaser to select the specific quality he needs.

The first table for separating elastomeric vulcanizates by types is based on resistance of any vulcanizate to changes in tensile strength of not more than ±30%; elongation, —40%; and hardness ±15 points after air oven aging at an appropriate temperature. All types are further separated as to class on the basis of their swelling in

Seen left to right above are: E. J. Thomas, Goodyear board chairman; Dr. Dinsmore, and R. DeYoung, Goodyear president.

Dinsmore Receives Goodyear 45 Year Pin

► Dr. Ray P. Dinsmore, internationally known authority on natural and synthetic rubber and vice-president of research and development for the Goodyear Tire & Rubber Co., Akron, Ohio, observed his 45th year with the firm at a meeting of Goodyear directors, at which time he was presented with the 45 year service emblem. Dr. Dinsmore was graduated from Massachusetts Institute of Technology in 1914 and joined Goodyear's Experimental Department in Akron that year. He later served at the company's Bowmanville, Ont., Canada, plant as compounder; as assistant chief chemist at the New Toronto plant; chief chemist at the Los Angeles plant; and as chief chemist at the parent company.

In 1932, Dr. Dinsmore was appointed assistant to the factory manager and directed the research that resulted in the development of Pliofilm. He became development manager in 1939 and vice-president in 1943. Under his direction, the research laboratories developed the first rayon cord tire; the Life-Guard safety tube; low pressure Super-Cushion tires; oil-extended synthetic rubber; rubber based paints; boilable vinylfilms; and food packaging films.

Dr. Dinsmore is past president of the Akron Section of the American Chemical Society, the Rubber Division of ACS and the Akron Rubber Group. He is a director of the American Institute of Chemical Engineers, a Fellow of the Institution of the Rubber Industry, the American Institute of Chemists, the American Association for the Advancement of Science and the Royal Society of Arts. He is also a member of the American Institute of Chemical Engineers, the American Academy of Political and Social Science and the Society of Automotive Engineers.

Dr. Dinsmore has received many awards including the Colwyn Gold Medal for 1947, which was awarded by the Institution of the Rubber Industry for his work in synthetic rubber research, its development and application to products. He also received the Charles Goodyear Medal for 1955 from the Rubber Division of the American Chemical Society. As assistant deputy rubber director for the United States during World War II, Dr. Dinsmore organized and directed research and development work on synthetic rubber for the government and coordinated the activities of both industrial and university laboratories. He has written many technical papers on rubber, contributed chapters to technical books and lectured to many scientific societies.

ASTM Oil No. 3 after 70 hours immersion at a temperature determined from the type table up to 150°C. Complete details of this system are explained in a paper by N. L. Catton (DuPont), R. C. Edwards (Chrysler Corp.) and T. M. Loring (Michigan Precision Molded) to be given at the International Rubber Conference in Washington, D. C., in November. Section IV-D-3 hopes to classify some 220 Armed Forces compounds according to the expanded tabular system by September.

ISO/TC 45 documents 398 and 400 which were objected to by the American delegation have been revised by the Netherlands delegation and new WG 6 documents 13 and 14 were distributed to the subcommittee. These new documents incorporated most of the suggestions of the American delegation. However, since it has never been entirely in accord with the basic thoughts advanced by these documents the subcommittee thought it proper to offer the expanded tabular systems as explained in the Catton, Edwards and Loring paper to Working Group 6 as representative of the current thinking in this country of a system which more fully describes what we desire. This will be done in time so that this ISO body can study the paper prior to its October meeting in New York City.

Subcommittee 17—Tests of Hardness, Set and Creep (S. R. Doner, Raybestos-Manhattan, Chairman): Due to the illness of Sherman Doner, Chairman of Subcommittee 17, J. J. Allen (Firestone) served as acting chairman. A report was submitted by Ross Shearer on effect of lubrication of test specimens for compression set. This included tests with abrasive cloth. The reported data showed that the use of a lubricant on the surface of the specimens showed no advantage over the present method D-395-55 for Method B. Two recommendations were made: (1) that ISO TC/45 be advised of these results and that Committee D-11 does not see any reason to revise D-395 to provide for lubricated specimens; and (2) that the details of this work be prepared for publication in the ASTM Bulletin. It was noted in this work that the use of abrasive cloth as an extreme method gave compression set results significantly higher than the regular method.

Ross Shearer also reported on molded versus cut specimens for practical purposes. It was recommended, therefore, that a revision for D-375 be prepared to provide for molded specimens. It was agreed that the dimensions of the mold cavity be specified rather than the dimensions of the batten. Several companies which have mold data will send the information to Ross Shearer and his task group. This task group will also review the entire method D-395 and suggest revisions that will bring it up to date. This will include revisions of the deflections specified by Method B to provide for 85 durometer and higher hardnesses. This subcommittee will also consider revisions in the Shore A and Shore D hardness methods to provide for the use of the Shore D instrument in place of the Shore A instrument in the range of 80-100 Shore A durometer.

Subcommittee 19—Tests for Properties of Rubber and Rubberlike Materials in Liquids. (F. H. Fritz, DuPont, Chairman): It was reported that Reference Fuel C was approved by D-11 letter ballot for inclusion in D-471. The proposed editorial changes to D-471 relative to weighing methods were unanimously approved after addition of the phrase "when handling materials that tend to volatilize at room temperature." This change gives consideration to the one negative vote received during the Subcommittee 19 letter ballot. It was announced that D. E. Manning (Pratt-Whitney Aircraft) has accepted the chairmanship of Task Group A replacing A. C. Simon. Mr. Manning reported on the reorganization of the task group and outlined the present plans for achieving its objective.

D. S. Messenger (Garlock Packing) chairman of the O-Ring section of subcommittee 10 presented a report covering a proposed expansion of D-1414. This includes two possible methods for making fluid immersion tests. One is similar to D-471 and the second is based on one done by WADC by Mr. N. Murray (Tech. Report 58-18 "Investigation of Oil Aging Procedures for Elastomeric Materials"—copies may be obtained from ASTIA Document Service Center, Knott Bldg., Dayton 2, Ohio). Since the findings of Mr. Murray's work (which have been incorporated in MIL-R-6372) are pertinent to Task Group A's activity, the report will be referred to the task group for consideration.

Subcommittee 21—Testing of Rubber Cements and Related Products (John F. Anderson, B. F. Goodrich, Chairman): Task Group 2A, a subgroup of Task Group 2 on Textiles and Wire Cord Adhesion, under the chairmanship of George R. Harrison, reported reasonable reproducibility between several laboratories of adhesion of rayon cord to rubber in three tests; H-test (General Tire), Pop test (Goodrich) and Pull-out test (Firestone). Insufficient data rules out any conclusion regarding the U-test (Goodyear). Further testing will be done in connection with the H-test, inasmuch as participating laboratories experienced from 2 to 12 cord breaks out of 15 tests conducted. It is felt that the use of a ¼" mold instead of the conventional ¾" mold will eliminate these breaks.

Task group 2B on Wire Cord Adhesion, under the chairmanship of R. H. Hertzog, reported some delays in collecting data due to conditions in the rubber industry. However, a program is in progress whereby molds, rubber stock and wire samples are being circulated among 9 testing laboratories for evaluation of various types of molds and consistency of results. Five of the nine are tire company laboratories and four are bead wire producers. Goodyear and Goodrich molds and rubbers were selected for the initial tests, with wire being supplied by National Standard Co. Each of the sub groups had held meetings in Akron, one on April 30, the other on May 1st. The enthusiasm and splendid cooperation of participants is expressed by Messrs. Harrison, Hertzog and Hicks and this expression is shared by the chairman of Subcommittee 21.

Task Group 1 under the chairmanship of C. R. Lupton, reported completion of development of non-destructive test of bonds between friction materials and Metcal, specifically as applied to transmission bands. Through the pressure and suggestions of John C. Smack, chairman of Subcommittee 6 in E-7, and H. E. Van Valkenburg, the group was able to resolve a negative vote standing in the way of adopting this method. Reference to the method as being accomplished by means of "a resonance type tester" and further reference to Method E-113-55T will be incorporated as an editorial change in the "Non-Destructive Test" which is to become part of D-1205-53T or a separate test under the jurisdiction of Subcommittee 21, ASTM-D-11, as may be decided by the officers of D-11. The method will be edited and submitted, as approved, to the secretary. Hugh Macey was asked to serve as a liaison representative between Subcommittee 21 and E-7. He already is acting in this capacity for Subcommittee 20. Mr. C. R. Lupton has agreed to serve as liaison between Subcommittee 21 and SAE Subcommittee 7 (brake bond tests).

Subcommittee 22—Cellular Rubber (H. G. Bimmerman, DuPont, Chairman): Arthur Sereque (Goodrich) presented a suggestion that the method of

calculating water absorption in D-1056 be revised and based on per cent by volume of water absorbed instead of the per cent by weight. This change appears logical since the specific gravity of the material being tested will not have so much apparent effect on the results. Mr. Sereque will rewrite the method and revise the tables for letter ballot in the subcommittee. G. H. Barnes (Goodyear) presented the results of the work done by S.P.I. and suggested limits for the tables of properties of flexible urethane foam for D-1564. He also presented proposed revisions for vinyl foam D-1565 and latex foam D-1055. The proposals incorporated suggested changes in designating grades which follow the system outlined:

Foam:
RC—Rubber Cured;
RU—Rubber Uncured;
VC—Vinyl Cured;
VU—Vinyl Uncured;
UC—Urethane Cured;
UU—Urethane Uncured.

The letters will be followed by one, two or three digits which indicate the pounds required to produce 25% deflection with a 50 square inch indentor. For example: RC-5—Cured Rubber Foam, 5 pounds; RC-90—Cured Rubber Foam, 90 pounds; RU-150—Uncured Rubber, 150 pounds; Sponge—RO, Rubber Open Cell; RG, Rubber Closed Cell; VO, Vinyl Open Cell; VE, Vinyl Closed Cell; SBO, Nitrile Open Cell; SBE, Nitrile Closed Cell; SCO, Neoprene Open Cell; SCE, Neoprene Closed Cell.

The digits following these letters will not represent the psi required for 25 per cent deflection but will remain as shown in D-1056 since this procedure appeared to be more desired by sponge manufacturers and consumers at this time. The subcommittee voted that the chairman letter ballot the members on setting up the tables according to the above plan in the following designations: D-1564, Urethane foam; D-1565, Vinyl foam; D-1055, Latex foam; D-1056, Sponge foam. In addition to the above letter ballot a new resiliency test for urethane foam will be letter-balloted.

The need for flammability tests was discussed at some length and some preference was shown for the new tentative method which is presented in the 1959 D-20 preprint. The chairman will circulate this method for comments. Caution was expressed that additional methods would probably be required for checking on flammability hazards of larger quantities such as warehouse stocks. C. S. Yoran (Brown Rubber) informed the group of the concern of the SAE Seating Subcommittee on variations of inductation load deflection results between different laboratories. In addition, this SAE group is concerned about additional tests which may be needed to characterize urethane foam for automobile seating applications, but the needs are not yet crystallized.

Subcommittee 23—Hard Rubber (W. J. Dermody, Electric Storage Battery Co., Chairman): The task forces working on revisions of D-530 and D-639 reported that they had each agreed to submit draft proposals for revision to subcommittee letter ballot. The D-530 proposal includes a revision of the ball drop impact test to improve the reproducability of the method. A new rupture resistance and distention procedure is also included and there has been extensive editorial rewriting of the entire method. D-639 has also been extensively rewritten and the scope of this method has been broadened from asphalt battery containers to include battery containers of hard rubber or equivalent materials.

D-1484 received two negative votes on D-11 letter ballot for advancement to standard. Both negatives were on the basis of current D-20 committee actions to write another Durometer hardness standard combining the durometer A and D procedures into one method. It was the feeling of Subcommittee 23 that any objection on the grounds of possible duplication of content might more properly be raised in D-20 rather than D-11 and that, since the negatives were concerned with inter-committee procedure rather than the technical competence of the method, these negatives should be overridden and D-1484 should be advanced to standard. This action was moved by H. Peters (Bell Telephone Laboratories) seconded by K. C. Bushway (Goodrich) and passed by unanimous vote.

P. Z. Adelstein, chairman of Subcommittee 1 of D-20 attended the meeting of Subcommittee 23 and presented its views on this section which are: (1) That a separate standard for plastics is both necessary and desirable, (2) That this should be a combined standard embodying procedures for Durometer A and D testing regardless of the differences in the calibration methods for the two instruments and the fact that neither D-530 nor D-638 tensile specimens of standard dimensions would meet the specimen size limits of the proposed procedure. Subcommittee 23 does not agree with either of these points and further feels that action of D-20 to implement them rather than utilize existing methods to advantage will create confusion.

J. R. Creager

J. W. Kosko

Goodyear Announces Promotions

► J. R. Creager, has been appointed vice-president of production for the Akron chemical plants of the Goodyear Tire and Rubber Co., Akron, Ohio, while J. W. Kosko, previously division foreman of Goodyear's Chemigum plant, has been named to succeed Mr. Creager as production manager of the Akron chemical plants. Mr. Creager joined Goodyear in 1933 as a member of the training squadron. He became a supervisor in chemical engineering in 1937; a development engineer in 1939; was placed in charge of chemical plants in 1941; and became manager of chemical production in 1951. Mr. Kosko joined Goodyear in 1941, also as a member of the training squadron. He was assigned to chemical engineering the following year, and was named division foreman at the Chemigum plant in 1956.

Task Force A will start shortly on a second draft proposal for a system of hard rubber classification by grades. An appeal was made for more manpower and K. C. Bushway and H. Sherwood were added to the task force. Notification was received of the appointment by D-20 advisory of E. C. Harrington to serve as liaison between that committee and Subcommittee 23.

Subcommittee 24—Rubber and Rubberlike Coated Fabrics (K. L. Keene, U. S. Rubber Co., Chairman): It was announced that a copy of a draft British standard for air-permeable PVC coated fabrics for upholstered furniture was received by the chairman. No interest was evidenced. The chairman reported no reply to the subcommittee request for assistance from the research group on the problem of abrasion. The test method for tack tear resistance was reviewed and the chairman was authorized to submit the test method to subcommittee letter ballot. The chairman was authorized to request Committee D-11 for permission to change the title of D-751-58T from "Testing Rubber Coated Fabrics" to "Testing Coated Fabrics" and to revise the scope to read "These methods describe procedures for the testing of coated fabrics."

The chairman was authorized to review the contents of D-751-58T and make any editorial changes if necessary for consistency with the new title and scope. K. L. Winkley presented a progress report on flammability tests. This report indicated need for more work which will be done by Mr. Winkley's task group. W. H. Bryan (DuPont) discussed the progress report on cold cracking which he presented to Subcommittee 25, which is investigating cold crack test methods for Subcommittee 24. Returns from a subcommittee letter ballot on the proposed revisions in procedure for adhesion test indicated 12 affirmative, 2 negative, and 1 not voting. The negative votes were the result of an error and were resolved. The chairman was authorized to submit this revision to D-11 for letter ballot.

The chairman was authorized to request Subcommittee 10 to include tension testing machines other than the pendulum type for tension testing. Mr. Hororkas' letter requesting that a new section of Subcommittee 24 be established for the purpose of setting up test methods and standards for coated fabrics used in the automotive industry was read. The chairman was authorized to make proper investigation to determine the extent of this interest and if warranted to establish this section or other working group.

Subcommittee 25—Low Temperature Tests for Rubber and Rubberlike Materials (R. S. Havenhill, St. Joseph Lead Co., Chairman): Irving Kahn (Department of the Army) and R. E. Ofner summarized the low temperature activities of ISO/TC 45. In this connection, the 0.25 inch width specimen for the ISO brittleness document was recommended to replace the narrow parallel sided specimen. This, if adopted would bring ISO into conformity with D-741 as regards specimen size. Three countries have submitted data on the low temperature compression set round-robin: Germany, Italy and Sweden. D-20 has requested further comparative tests before allowance of the gravity operated strikes. Mr. Ofner will send several stocks to G. W. Goodson so that comparative tests, at the same measured velocity, can be obtained with the Solenoid and Gravity operated machines. The chairman read a letter from W. H. Reynolds stating the Aminco was modifying the Gehman to meet the latest revision of D-1053 on stiffeners. This calls for a separate head which can be used with liquid bath or placed in a cold box.

In discussing low temperature test for coated fabrics, W. H. Bryan, chairman of this committee, reported that he had sent out a questionnaire to 26 companies including producers and consumers to determine if individual requirements could be met with a single type standard test. He also analyzed the 20 type tests now in use and divided them into five categories for further review. The following personnel are to be included in his committee along with representatives from Chrysler, Ford and D-9: W. H. Bryan, chairman (Du Pont); L. R. McManus (Q.M. Research & Engineering Command); G. W. Goodson (Sperry Gyroscope); H. G. Winter (Cadillac Motor); and K. L. Keene (U. S. Rubber Co.). D. C. Scott (Scott Testers) and Mr. Winter promised to send details of special fabric testing equipment to Mr. Bryan for study by his committee.

Cellular Plastics Production Up

► Production of cellular plastics reached 31,500,000 pounds in 1957 which represented a 97 per cent increase over 1956 according to the Cellular Plastics Division of the Society of the Plastics Industry, New York, N. Y. The Society said that consumer interest in cellular plastics over the past four years has continued to expand rapidly due to the products' excellent suitability and serviceability in diversified applications. Flexible foamed plastics are being used increasingly as cushioning materials in furniture, institutional seating, and for varied types of transportation seating in subways, railroads, buses, airplanes and automobiles. These materials are also being used to a large extent in such applications as carpet underlay, items of wearing apparel, as well as for sun visors, arm rests and crash pads in automobiles.

Subcommittee 26 — Processability Tests (Rolla H. Taylor, Scott Testers, Inc., Chairman): The proposed revision of Methods D-927 and D-1077 were considered in detail and minor changes were agreed to. Since the proposed method combining Methods D-927 and D-1077, had been distributed to members of the subcommittee by Mr. Ross Shearer, chairman of the task group appointed to write the now proposed method, prior to the meeting and since major changes in the proposal were recommended, the chairman was authorized to recommend to D-11 that it submit the proposed method to the Society for acceptance as a tentative method replacing the current methods D-927-57T and D-1077-55T subject to retroactive letter ballot of D-11 on the proposed method. The proposed method will be submitted to the secretary of D-11 as soon as it can be written to incorporate the changes mentioned above.

J. F. Kerscher (Goodyear) chairman of the task group appointed to study extrusion dies and to recommend a standard Garvey die informed the subcommittee that his group had agreed on a die which should meet the immediate needs. Persons interested in determining the suitability of this proposed die were invited to contact Mr. Kerscher for information on how the die may be obtained.

Subcommittee 27—Tests of Resilience (W. A. Frye, Inland Mfg. Div., GMC, Chairman): The D-11 letter ballot on D-945 (Yerzley Resilience) was reviewed. The chairman was instructed to survey Yerzley users to determine if a program to determine inter-laboratory reproducibility is desired. Discussion was held on D-623 (Flexometer Tests). Selected laboratories will be contacted to determine standard Goodrich Flexometer conditions used and suggestions for future action. The first draft of a possible recommended practice on forced vibration testing was presented. This 14-page document is informative in nature and describes several methods now in use. It will be sent to interested parties for comment and correction. Any member of D-11 who is interested in making suggestions on this method is requested to contact the chairman of Subcommittee 27 to obtain a copy of the draft.

Subcommittee 29—Compounding Ingredients (A. E. Juve, B. F. Goodrich, Chairman): A task group under the chairmanship of Ralph Treat (J. M. Huber) gave a progress report on its assignment to evaluate the statistical procedure and the data obtained in connection with the preparation of the 300,000 pound lot of reference HAF

black. The check resulted in the rejection of six 10,000 pound lots leaving a unit of 200,000 pounds. The group reported that this material was of satisfactory uniformity. It also suggested that for future preparation of reference lots, this or a similar group be given an opportunity before the lot is made to suggest a well-designed statistical test plan. This task group is also assigned the job of setting up tests to measure any possible changes in the reference lot as the result of storage conditions on time. Two tests after three and six months have been completed with no observable changes in the black.

Another task group under the chairmanship of Tom Bolt (Godfrey L. Cabot) was assigned the task of evaluating the proposals of a carbon black producers group for modification of D-1522. These included: (a) a single recipe based on natural rubber with short cures for furnace blacks and long cures for channel blacks; (b) a single concentration of black of 50 phr (except for MT and FT); (c) a single reference black for all testing. As a result of extensive testing it was recommended that these suggestions be adopted. It was proposed by the sub-committee that a preliminary rewrite of method D-1522 be made incorporating these changes but that action on it by D-11 be deferred until the proposed revision of D-15 is in more nearly final form. It was proposed at this point that Subcommittee 29 prepare a specification for carbon blacks based on the revised D-1522 as a test method and on the extensive data now available on a variety of black grades. The proposed specification is to include various properties of the blacks themselves as well as their properties in rubber. The methods for the former properties are under the jurisdiction of D-24.

A task group was authorized to prepare a first draft of a specification. John Gifford (Witco Chemical) will be chairman. Other members will be J. F. Svetlik, Tom Bolt, R. A. Emmett, R. Treat, Carl Simon, N. T. Bekema, Bob Knill, Larry Mason, Ray Jones, F. I. Sackfield and A. E. Hicks. It was proposed and approved by the subcommittee that as soon as the revised D-1522 is written and the first draft of the specification is available that arrangements be made for some producer-consumer combinations to start using them, even before letter balloting either in the subcommittee or in D-11 in order to accumulate some experience with their use.

A member of a task group reporting to Subcommittee 13 on test recipes for SBR gave a brief report of the progress of their work. Mr. Hammell (Enjay Laboratories) presented a proposal that the procedures for mixing and vulcanizing the butyl black stock in D-15 be modified to conform to the practice of the production plants. One of the items involved changing the curing temperature from 302°F. (150°C) to 307°F. (152.8°C.). A task group was authorized to consider these proposals.

Technical Committee on Automative Rubber (W. J. Simpson, Chrysler Corp., Chairman): The proposed replacement of D-736 by the D-746 Cold Brittleness Test has not met with the approval of SAE and has been returned to Subsection 4L. The Automotive Hose Group is continuing its work on the Automotive Air Conditioning Hose Specification, while the Air Conditioning Hose Method of Test is up for consideration by ASTM. Work on Coolant Hose is being considered. The new Section X on Gaskets has considerable activity on specifications and new materials, while ASTM is still considering the recommendations of the Study Group. Section XI-A with a new chairman, H. G. Gillette (Precision Rubber Products) is quite active in O-rings and rectangular seals.

Section IV-D has added Task Groups on Neoprene under B. A. Anderson, Acrylonitrile Polymers under N. Duke, and R-Tables under M. Lowman. Other Section IV activities include, evaluation of gear lubricants and transmission fluids in Section IV-H; urethane foam tables and nomenclature in IV-N; review of silicone compounds in IV 0-1; good progress on a natural latex product specification and a start on neoprene latex products; continued progress on adhesion to metal; and investigation of stress relaxation. Tech A and Section IV approved and reaffirmed that D-746 be used in place of D-736 in D-735 and override the negative votes. Tech A and Section IV also approved using the key pages in D-735 as a place for information on new materials properties.

Yohe Addresses Joint Meeting Of Buffalo and Ontario Groups

► The 18th Annual International Meeting of the Buffalo and Ontario Rubber Groups was held on May 1 at the Sheraton-Brock Hotel in Niagara Falls, Ontario, Canada, with about 350 persons in attendance. The joint meeting was held immediately after the annual conference of the Rubber Division of the Chemical Institute of Canada, which was held at the same hotel. Guest speaker at the joint international meeting was Robert V. Yohe, president of B. F. Goodrich Canada, Ltd., who delivered a talk on "Productivity—Problem or Solution?"

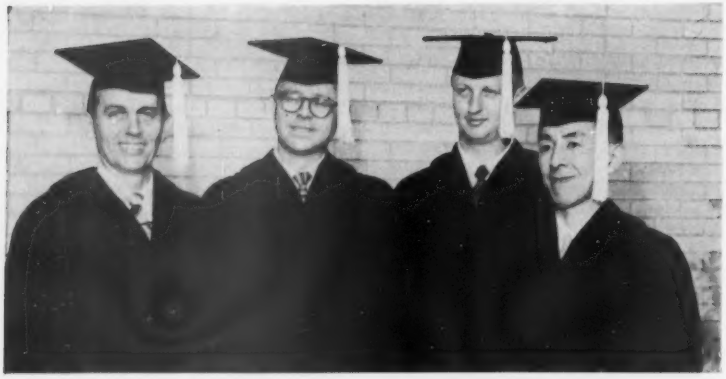
Mr. Yohe defined productivity as any action that is taken to produce the same amount of goods at a lower cost, or more goods of same quality at no increase in over-all cost, or more goods at the same unit cost. It should therefore be clear, he noted, that increased productivity can come about in a complete market in many ways. He explained that the debate on productivity in both Canada and the United States is over the subject of increased productivity. In some quarters, he explained, increased productivity is a matter of misconception and in others, he said, it is considered as a menace to trade unionism.

Mr. Yohe remarked that the misconception is that increased worker productivity is defined by some to mean that workers must sweat harder to produce more. This is not so, he exclaimed, improved productivity means less human sweat. Industrial productivity is generally increased through investment in better, more efficient plants, better machinery, methods and processes, and better and more effective scheduling.

Mr. Yohe told the joint assemblage that they, representing the technical and development phase of the rubber industry, hold in their hands the answer to his question "Is productivity a solution to our problem?" He pointed out that increased productivity *is* a problem. Temporarily, it may increase unemployment and incite union leaders to ask for cost increases that tend to nullify the cost benefits that increased productivity brings. To the extent that these demands are greater than productivity improvements, they are inflationary and even if they were not, they would tend to keep industry from being competitive with lower cost producers. This is true, he said, since increased productivity leads to lower costs and better products, thus increasing sales and employment.

Actually, stated Mr. Yohe, increased productivity should not only give benefits to workers through increased pay but should also give benefits to consumers through lower prices and improved quality, and benefits to industry through improved returns. Mr. Yohe told the group members that they should use or make available every known material, method, or piece of equipment that can be found to get industry off the treadmill of just keeping up and onto solid ground where a step forward can be measured in progress against total costs.

On June 12, the Ontario Rubber Group held a Ladies' Night Ball at Leisure Lodge in Preston, Ontario. The ball was attended by 81 couples and was the first such event attempted by the group. Each lady attending was presented with a pair of earrings and dancing was enjoyed under the stars to the music of Johnny Costigian. The evening was topped off by a smorgasbord buffet.



Recipients of the first doctorate degrees to be awarded by the University of Akron (Left to Right): Marvin A. Deisz, Edgar E. Bostick, William E. Gibbs and Masao Ohta. Ralph Milkovich, who received his degree in absentia, is not shown.

University of Akron Awards First Ph.D. Degrees; Bostick Named Winner of Annual RUBBER AGE Award

► Five rubber chemists received the first Doctor of Philosophy degrees to be granted by the University of Akron at the University's 87th Annual Commencement on June 8. The chemists were Edgar E. Bostick, Marvin A. Deisz, William E. Gibbs, Ralph Milkovich and Masao Ohta. Dr. Bostick received his B.S. in chemical engineering from Alabama Polytechnic Institute in 1950. In 1958, he received the Thomas T. Orr award from the ASPE for meritorious work in plastics technology. His Ph.D. thesis topic was "Anionic Polymerization of Cyclic Siloxanes." Dr. Bostick has joined the staff of the Institute of Rubber Research at the University.

Concurrently, it was announced that Dr. Bostick had been named winner of the annual RUBBER AGE Award in the amount of $100 for the preparation of the outstanding doctoral thesis in rubber chemistry. He has had four years of experience as a chemical engineer in the Product Development Division of the Goodyear Tire & Rubber Co. Currently, he is doing post doctoral research at the University.

Dr. Deisz, who received both his B.S. and M.S. degrees from the University of Akron, was the 1952 Thomas T. Orr award winner. His thesis was entitled "Kinetics of Formation in Urethane Polymers." Dr. Deisz has been appointed to the staff of the Shell Chemical Co., Emeryville, Calif. Dr. Gibbs, who also received his B.S. and M.S. degrees from the University of Akron, now serves with the U. S. government at the Wright-Patterson Air Force Base. His thesis topic was "The Emulsion Polymerization of 2,3-Dimethyl butadiene-1,3."

Dr. Ohta was born in Kobe, Japan, received his B.S. degree from the Kyoto Imperial University in 1942 and his M.S. degree from the University of California in 1956. From 1943 to 1953, he was employed by the Mitsui Chemical Co. in Tokyo as a research chemist. Dr. Ohta has joined the Monsanto Chemical Co. in Dayton, Ohio. His thesis was entitled "Degradation of Polycondensates." Dr. Milkovich, who received his doctorate in absentia, was awarded his B.S. from Duquesne University in 1951 and his M.S. by the State University of New York College of Forestry in 1957. From June 1951 to 1955, he was an assistant chemist for Koppers Co., Inc. Dr. Milkovich, who also received the Thomas T. Orr award from the ASPE in 1959, submitted a thesis entitled "Monodisperse Difunctional Polymers." Dr. Milkovich is now associated with the Shell Chemical Co. in Torrance, Calif.

Offers Booklet on Pennox

► Pennsalt Chemicals Corp., Philadelphia, Penna., has issued a new booklet describing its Pennox antioxidants. The booklet gives complete information on the new series including properties; compounding; physical tests; staining and discoloration; use in styrene rubber manufacture; and toxicity and handling. Also available from the firm is Bulletin S-152, which deals with "Pennox Antioxidants for Latex."

Eastman Machine Moves Office

► Eastman Machine Co., Buffalo, N. Y., has announced that its New York City branch office has been moved from 315 W. 35th St., to 534 Eighth Avenue, New York 18, N. Y. The company reports that the new offices occupy the entire second floor of the building and was planned and equipped to facilitate the handling of machines and the dispensing of parts and supplies. Sol Redlich is the manager of the branch office.

Southern Ohio Group Outing

► The Southern Rubber Group held its eleventh annual summer outing which consisted of a golf tournament on June 5 at the Madden Park Golf Club in Dayton, Ohio, and an outing on June 6 at the Recreation Center of the Inland Manufacturing Division, GMC, in Dayton. Jack Feldman (Inland Mfg. Div.) was the general chairman of the two-day affair. At the golf tournament, the blind bogey winners were Lou Keyes (Dayton Rubber); Dale Creech (Inland Mfg. Div.); Bill Herberg (Dow Chemical); John Barry (Witco Chemical); and Lynn Blocher (Inland Mfg. Div.).

Over 140 members attended the June 6 outing at which a full schedule of games was held. Highlight of the day was the annual baseball game between the "Users," managed by Bob Puckett (Inland Mfg. Div.) and the "Purveyors," managed by Roy Marston (Columbian Carbon). The "Users" won the game by a score of 7 to 2.

Game winners were: *Shuffleboard*, Joe Holmes (Schenectady Varnish) and Jim Saettel (Inland Mfg. Div.); *Kick Golf*, Skip Morris (Copolymer Rubber & Chemical) and Al Ipiotis (Inland Mfg. Div.); *Golf Chip*, Jerry Furrey (Inland Mfg. Div.) and Bob Radow (Dayton Rubber); and *Horseshoes*, Pick McBride (Dayton Rubber).

Gehrig Plans New Tire Plant

► Gehrig Rubber Manufacturing Corp., Fort Wayne, Ind., plans to locate a new plant in Portland, Ind., for the manufacture of antique and colored tires. The firm, which has been engaged in the reproduction of antique tires for some time, can reproduce an exact duplicate of any tire for any antique automobile. The manufacture of colored automobile tires is a new operation. Through a process backed by the Columbia-Southern Chemical Co., the firm will manufacture all-white tires, white sidewall tires with various colored treads and all-white or colored airplane and motorcycle tires. Robert Gehrig will serve as president and chairman of the board; Arthur W. Powell as vice-president and director; Oakley G. Baugher as secretary-treasurer and director; and Wilbur K. Sheets will be in charge of production.

Phillips Petroleum Expands

► Phillips Chemical Co., Bartlesville, Okla., plans to expand ethylene production capacity at its Sweeny, Texas, plant from the present 180 million pounds to 255 million pounds annually in order to meet increasing demand for ethylene. The Sweeny facility, located about 50 miles south of Houston, delivers ethylene by pipe-line to Houston area polyethylene plastic manufacturers. Completion is expected by year's end.

Sir Geoffrey Clay Announces $3.5 Million Natural Rubber Research-Development Program

Sir Geoffrey Clay, K.C.M.G., O.B.E., M.C., has announced expanded research and development for Malaya's natural rubber industry, whose research he now heads. Sir Geoffrey, who assumed his post of Controller of Rubber Research in Kuala Lumpur, Malaya, on April 1, said that the Malayan rubber growers had increased by 50 per cent the funds assessed for research, currently making available $3,500,000 for this purpose.

This sum is derived from an assessment of ¼ cent (U. S.) on each pound of rubber Malaya exports. It was pointed out that the amount is not static. As the result of replanting with high yielding rubber, Malayan production is growing each year with the fund growing correspondingly.

"Similarly," Sir Geoffrey said, "research can never remain static. What is wanted is research balanced between the production and consumption fields, linked with essential development work. Our main aim therefore is coordination and expansion of these three areas wherever necessary."

Technical Service Group

Sir Geoffrey noted that establishment of a Technical Service Group in the U. S. was among the expansions contemplated by his industry. "One of our lacks in dealing with rubber manufacturers here," he said, "has been qualified technical personnel who could help with problems having to do with compounding and other production concerns. We have already introduced Technical Service in England and have found it most effective. We hope that similar service in America will prove equally useful."

Sir Geoffrey mentioned that his trip to this country was part of a two-month on-the-scene study of natural rubber in markets about the world. Out of the findings of his journey, he expected to develop a plan which he would submit to the executive 10-man Malayan Rubber Fund Board, of which he is chairman. Ratification would put into effect Technical Service and other recommendations designed to streamline and make more effective the industry's efforts on behalf of its product. Sir Geoffrey said that "in 1958, the natural rubber industry sold some 1,985,000 tons, 30,000 tons more than the 1,955,000 tons it produced." For 1959, it is forecast that the industry will repeat, selling some 1,990,000 tons against production of 1,960,000 tons.

"According to economists with rubber manufacturers and others who deal with rubber, we shall be selling all we can produce, and then some, for several years to come," Sir Geoffrey stated. "This means that for the immediate future, natural will be in a seller's market. Our job is to use this cushion to prepare for the time when the market may shift."

Replanting Program

Thanks to research carried on at the Kuala Lumpur facilities, Malayan rubber growers are now replanting with material that will produce some 1,500 to 2,000 pounds per acre per year instead of the 490 pounds that is average today.

"Tying this to specifics," Sir Geoffrey said, "Malaya last year produced some 660,000 tons of rubber. Just on the basis of high-yielding replanting carried on through 1958, by 1965 Malaya will be producing some 850,000 to 900,000 tons annually; an increase of approximately 30 per cent in rubber production that will be costing less per pound to take out.

"Our long range problem," Sir Geoffrey noted, "may well be price. Today natural is selling at 35 cents per pound, a premium of some 12 cents over the cost of GR-S' 23 cents. This price is, of course, established in a free market. As long as the market will pay a premium for our product and still buy all we produce, well and good.

"Our job though is to prepare for the worst. Should the day come when competition or other economic forces bring the price of natural down, we must be in the position to sell profitably at prices competitive with those for synthetic. We can do this today. With our replanting of high production rubber, we shall be in even better position to do it several years hence.

"As pointed out previously, one of the things we shall recommend will be more coordination of effort, both within our own laboratories and with other groups also working towards making natural a more broadly useful commodity. Among the steps we have in mind for our own people are visiting committees, each comprising 3 or 4 scientists outstanding in specific areas. These will meet with our laboratory personnel perhaps two or three times a year for evaluation sessions. Such meetings will be directed at determining the progress of projects already in work, and setting up others to keep natural always competitive.

"The development of high yielding trees, new methods of tapping, hormone tree stimulation, improved fertilization practices and other projects now in progress at our agricultural laboratory is putting natural in an increasingly excellent price position. At our London laboratories the development of advances already in being and others which today are still in the test tube, are keeping for natural the quality advantage it now has, and abetting that advantage to make natural even more useful.

Two Commodity Market

"These are the efforts that are the cornerstone of natural's confidence in the future. As we see it, that future is built about a two-commodity rubber market—natural and synthetic. In an expanding world economy, with the 4,000,000 to 5,000,000 ton annual consumption forecast within the next decade, there is room for both natural and synthetic rubber to sell profitably side by side. The coordination and expansion now being planned for our research and development program is directed at assuring for natural that its side will be a full one."

For an exclusive RUBBER AGE interview with Sir Geoffrey please turn the page.

Speaks With Sir Geoffrey Clay

At a special conference held at the Plaza Hotel in New York City, Sir Geoffrey outlined for the editors of RUBBER AGE his views on natural rubber; his new position, and the situation in which natural rubber finds itself today. The questions asked of Sir Geoffrey and his direct responses, follow:

Question: What are the primary functions involved in your new capacity?

Answer: Well, my title is that of Controller of Rubber Research and Chief Executive Officer of the Malayan Rubber Fund Board.

Question: Where will you maintain headquarters?

Answer: My headquarters are in Kuala Lumpur which is headquarters of the Board.

Question: Do you envision the creation of a staff of assistants?

Answer: The Malayan Rubber Fund Board consists of ten members including me, five of whom are nominated by the Rubber Producers Council of Malaya. Two others are nominated by the Ministry of Commerce and Industry on the advice of the Rubber Producers Council and two are nominated by the Minister without reference to anybody at all. At present we are starting on a small scale. In addition to myself there is an administrative assistant who was formerly "The Chief Minister" of one of the native states. He is retired from the Malayan Civil Service and will serve as administrative assistant on non-technological aspects. There is the possibility that a deputy controller of rubber research may be appointed but that has not yet been decided.

Question: What special activities, if any, will be taken to promote the increased use of natural rubber?

Answer: What I think we are visualizing is the possible development of a technical advisory service to the manufacturers who use natural rubber. It is a two-way objective, one is to assist them in getting knowledge of possible new modified natural rubbers such as superior processing rubber, and, secondly, to assist them in any difficulties they meet in the compounding or mixing or mastication of natural rubber or blending with synthetic rubber. Those are two functions which are of positive assistance to manufacturers.

Another alternative and secondary value which may come is the reverse traffic from the factory floor to our research people—that is the problems which are met with on the factory floor in the use of natural rubber as against synthetic or blended with synthetic—problems which merit research or technological investigation. We should welcome that as another result from the technical advisory services. We do not anticipate any large publicity campaigns. We regard the Natural Rubber Bureau as the organization which can call attention to the value of natural rubber, but we ourselves plan no publicity campaign as such.

Question: Can natural rubber maintain its present position in relation to synthetic as a long run proposition?

Answer: I think that is largely a question of price. I have not the slightest doubt in my own mind that the well run estates in Malaya can produce natural rubber at a price at which it can compete with synthetic. There are inefficient estates and there are smallholder problems. We are tackling those by trying to induce through advisory services a higher standard of cultivation and the better use of materials and fertilizers and all the modern techniques which go to more efficient production. Productivity is one of the problems of the Malayan rubber industry just as in many other industries.

Question: Is there some merit to the suggestion that the future of natural rubber lies in the field of specialty rubbers—over the long run will it continue to be important as a general purpose polymer?

Answer: Well, so far I think natural rubber has characteristics that for certain uses has achieved it a supreme position. That of course may be altered by the development of some of these newer synthetics like polyisoprene. But I would say that so far as conventional uses of natural rubber are concerned, natural rubber will hold its own. As far as price factors are concerned, natural rubber has little to fear from synthetics in its established conventional fields where its presence is supreme because of its characteristics.

Question: What type of future is foreseen for SP rubbers?

Answer: That is a technical question which I am not really competent to deal with. Superior processing rubbers have been expanding their use particularly in the United Kingdom. Now the same thing might reasonably happen in the United States with the help of technical advisory services. I do think there is a limited use for that sort of special rubber but every little helps and here is a case for developing the use of natural on its special qualities and special values.

Question: Are rubber plantations today managing to attract the personnel and capital needed for successful operation?

Answer: I can only speak now from a limited experience in Malaya. Since I took over my appointment I have traveled and seen the estates. I have seen efficient estates and I would say that the quality of management is as good as ever it was. There will naturally be a tendency toward Malayanization of management on the estates and I think we should consider the possibility of special training courses for estates managers with that object in view. There is a developing, moreover, a sort of diversification which is a desirable and a laudable development. One group of rubber estates for instance are developing high level tea production. This is a good thing because there are three or four major plantation crops which Malaya could produce in addition to rubber.

Question: Are any changes foreseen in marketing procedures for natural rubber?

Answer: Well, marketing does not really come within my portfolio except indirectly insofar as it may affect smallholder production. Smallholder production is assisted by advisory services based on the Rubber Research Institute of Malaya and therefore financed from the Malayan Rubber Fund. So far as I know, there is no conception of any drastic amendment or alteration in the marketing arrangements at present.

Question: What progress is being made in transplanting to high-yield acreage and new production methods?

Answer: As I remember, I think the figure I saw in regard to 1958 was somewhere about 71,000 acres of smallholder rubber replanted last year. This is quite appreciable in terms of acreage

and in terms of potential production. The existence of high prices is obviously a deterent towards replanting. The smallholder hates to see his trees destroyed no matter how low their yieldings provided the prices are a dollar a pound (Malayan) or thereabouts. The replanting grant of the equivalent of two hundred American dollars an acre is attractive and is welcomed by the smallholder.

Question: To what degree does rising nationalism in the rubber growing areas influence rubber production?

Answer: The present Malayan government is an example of the development of a multi-racial government and one which I have admired tremendously since my arrival in Malaya. It is a government which stressed its welcome to private enterprise and private investment and as far as I know nationalism has had no effect so far on the investment of capital or the management of Malayan enterprises in Malaya. In fact, the government has repeatedly stated they welcome overseas capital and investment both in the plantation field and other fields in Malaya.

Question: Are labor problems becoming more acute?

Answer: The labor position as far as I can see is one of happy cooperation between the unions and the employers. Recently an agreement was concluded which was the result of careful study by both sides and which has been accepted extremely well by both labor and management.

Question: Quality controls are always a factor. Are producers and consumers being brought closer together on this point?

Answer: I was very happy to hear from the chairman of the Rubber Trade Association of New York that the number of claims coming from Malayan rubber is very small indeed. This indicates a happy position between the producer and the consumer. I was equally interested to find that what the rubber manufacturer wants more than anything is regularity in quality rather than higher quality. Those are two important points in my mind which I shall take back and note for my report when I get back to Malaya. So far as the Malayan industry is concerned, it is comforting to note that quality claims are very few and far between in the case of New York or American buyers of Malayan rubber.

Question: How will United States consumers benefit?

Answer: The principal effect as far as I can see will be from the application of research. Research will serve to increase production and U. S. and world requirements will be met more easily. Quality we have touched on already. There may also be some research aimed at providing modified forms of natural rubber to meet competition from synthetic. Our efforts will be to produce natural rubber in greater supply at lower cost. Price is a function of the market and not a function of the producer.

Seen (left to right) are H. C. Bugbee, president of the Natural Rubber Bureau, Sir Geoffrey, and M. E. Lerner, editor of RUBBER AGE.

Managing Editor B. J. Kotsher (left) interviews Sir Geoffrey.

Sir Geoffrey discusses his new position with Mr. Lerner.

Question: Would you care to offer any concluding remarks?

Answer: As I said earlier, my main objective is to make the acquaintance of people concerned with the use of Malayan rubber. I am impressed particularly with the fact that there are large consumers of natural rubber who are also consumers of synthetic. The two are complementary. I would stress that I would like to see cooperative research, complementary research, and each type of rubber used to its best advantage. This may include blending.

Now if it were possible for natural rubber research to be combined with synthetic rubber research either in some independent institution such as a university or even in fact by some of the big rubber users themselves, we should be interested in that and possibly offer our cooperation if it were possible. I do realize, however, the difficulties in getting that sort of cooperative research program established when private interests are so firmly entrenched in competitive efforts in the synthetic field.

Beyond this, I should simply like to say that we in the Malayan natural rubber industry are convinced that the future holds a profitable market place for both natural and synthetic. Within this framework, we see our job as trying to produce sufficient natural so that there is always a good supply at a competitive price, and to make natural as useful as possible to our customers. That's the goal at which our expanded research and development efforts are being directed.

Names in the News

Wilfred P. Fletcher of the Institute of the Rubber Industry (London), has been named manager of the New Elastomers Research Laboratory recently completed by DuPont Co. (U. K., Ltd.) at Hemel Hempstead, Hertfordshire.

C. Richard Herman, formerly with Polymer Industries, Inc., has been named vice-president and director of research and development at Rubber Latex Co. of America.

C. O. McNeer, general sales manager of the Chemical Division at the Goodyear Tire & Rubber Co., has been honored on completion of 25 years of service with the company.

Theodore D. Trowbridge has joined the Applied Research Section of the New Products Department at Godfrey L. Cabot, Inc.

Floyd F. Miller, who was formerly associated with the B. F. Goodrich Chemical Co. Chemical Center, has joined Goodrich-Gulf Chemicals, Inc., as a senior engineer.

John V. Drum, previously vice-president in charge of sales for the Detroit Brass and Malleable Co., has been appointed marketing manager of the Mechanical Goods Division for the U. S. Rubber Co.

August Bach, 86 year old retiree of the Pantasote Co., has been honored by the Equitable Life Assurance Society of the United States as the sole survivor among those covered by the world's first group insurance policy.

Robert L. Fisher has been appointed general sales manager for the Mastic Tile Corp., while **Norman Martin** has been named Western sales manager with **Lawrence Horan** as his assistant, and **Joseph Morris** has been named Eastern assistant sales manager.

Hans Stauffer, president and director of the Stauffer Chemical Co., has been appointed to the board of directors of the American Smelting and Refining Co.

Gaylord Kanavel, senior chemist for the Thiokol Chemical Corp., has transferred from the Butyl Group at Trenton to the Urethane Section, which is now located at Bristol.

William H. Onderdonk, associated with the company since 1941, has been named factory manager of the Gilmer plant for the U. S. Rubber Co., succeeding **Howard K. Norris,** who has been named production manager for the company's Mechanical Goods Division.

Ben P. Fortin, a representative in the field service organization of Oakite Products, Inc., has been transferred from the Tyler, Texas, to the Los Angeles area. He will be succeeded in Tyler by **Henry L. Jones. J. G. Hickey,** serving in the same capacity, has been transferred from San Francisco to Sacramento, while **Wayland E. White** has been appointed to cover the Corpus Christie territory.

John Logan has been named a vice-president of the Simplex Wire and Cable Co.

Howard W. Smith, president of the Pawling Rubber Corp., has been elected president of the Mid-Hudson Industrial Association, in Poughkeepsie, N. Y.

David H. Pyle, previously senior service engineer in the Philadelphia district for Hall Laboratories Division of Hagen Chemicals & Controls, Inc., has joined the U. S. Stoneware Co. as sales representative in the Philadelphia territory.

Albert E. Hosier, technical director of the Faultless Rubber Co., received an honorary Doctor of Science degree at the June graduation ceremonies of Ashland College.

David X. Klein, formerly manager of research at the Garfield, N. J., laboratories of the Heyden Chemical Division of Heyden Newport Chemical Corp., has been promoted to technical director of the division.

Dr. Bogislav von Schmeling, a research plant pathologist, has joined the agricultural chemical research and development staff of the Naugatuck Chemical Division of the U. S. Rubber Co.

Robert E. Jeffery, a veteran of 28 years with the Garlock Packing Co., has been named controller of the company.

Ralph B. Warner, previously chief chemist at Worthington Ball, has been promoted to the newly created position of technical superintendent.

William H. Thorbecke, manager of the International Division of the Continental Carbon Co., an affiliate of the Witco Chemical Co., has also been elected vice-president in charge of the International Division of Witco Chemical.

John Andrews, who previously served as president and managing director of Cabot France, S. A., has been named assistant director of foreign operations for Godfrey L. Cabot, Inc.

John C. Lukman, formerly development manager at the Leominster, Mass., operations of the Borden Chemical Co., has been promoted to works manager of the company's polyvinyl alcohol operations in Leominster.

Donald W. Gates, manager of automotive chain store sales for the Associated Tires and Accessories Division of the B. F. Goodrich Tire Co., was honored at a banquet on the occasion of his twentieth anniversary with the Goodrich organization.

W. W. Thies has been appointed to assist **F. L. Hopper,** director of the Planning & Distribution Division for the Firestone Tire & Rubber Co., while **G. R. Herbig** has been named to succeed Mr. Thies as manager of the Production Planning Department.

Frederick R. Matthews has been named manager of the Silicone Specialties Division of the Dow Corning Corp. and will continue his duties as manager of the Greensboro, N. C., plant in addition to assuming his new responsibilities.

Clifford S. Farmer, assistant controller for the B. F. Goodrich Co., has been elected to membership in the Controllers Institute of America.

David S. Clark, formerly general sales manager of R. L. Kuss and Co., has been appointed sales manager of the Surety Rubber Co.

Robert K. Dix has been elected a vice-president and will head the Products Management Department for the Enjay Co., succeeding **H. J. Rose,** who recently resigned to become a vice-president of Esso Export Corp.

Daniel H. Handy, retiring treasurer of the Lee Rubber & Tire Corp., was honored recently at a testimonial dinner attended by more than 200 friends, relatives, executives and employees.

Harry C. Holmes has been named sales representative for the Simonds Worden White Co., where he will be responsible for the sales of grinding wheels and abrasive products in western Illinois and eastern Iowa.

Thomas M. Ware, president of the International Minerals and Chemical Corp., has been named chief executive officer of the company succeeding his father, **Louis Ware,** who continues as chairman.

Henry B. Puff has been promoted to assistant production manager of resins for the Durez Plastics Division of the Hooker Chemical Corp.

J. C. Blue has retired as general manager of the Des Moines, Iowa, tire plant of the Firestone Tire & Rubber Co.

U.S. Rubber, Firestone Charged With Price-Fixing of Mattresses

► U. S. Rubber Co., New York, N. Y., and the Firestone Tire and Rubber Co., Akron, Ohio, have been indicted on charges of illegally fixing the prices of synthetic foam rubber mattresses. The indictments, which were returned by two separate Federal grand juries, stem from a major investigation of the rubber industry, now pending before a grand jury in Chicago, Ill. Justice Department officials have not disclosed details of the broader inquiry other than to say the mattress indictments resulted from information developed by the Chicago investigation.

U. S. Rubber was named on a single-count indictment handed up by a Denver grand jury. The Firestone indictment, also a single count, came from a Memphis grand jury. Officials said the grand jury sites were chosen because the activities under question occurred in those areas. Both companies were charged with violating the Sherman Antitrust Act by conspiring with distributors, retailers and others to fix minimum retail prices of foam mattresses for which they manufacture filler material made of synthetic foam rubber. Each charge carries a maximum fine of $50,000.

The U. S. Rubber indictment charges the company with conspiring with distributors, assemblers, suppliers and retail stores to fix the prices of Koylon mattresses and all other mattresses identified by a company trademark or trade name. The indictment also accuses U. S. Rubber and its co-conspirators of refusing to sell to businesses that sell the mattresses below the agreed-upon prices. Firestone was charged with a similar offense, although the company's operations are somewhat different than those of U. S. Rubber. One difference, the government said, is that Firestone does not manufacture a completed foam mattress under its own brand name.

The government said that U. S. Rubber and Firestone are among the seven major producers of foam mattress fillers. U. S. Rubber also markets a mattress under the brand name of Koylon. During 1953 to 1957, the government said, U. S. Rubber sold mattresses, fillers and accessories having a retail value of more than $55 million. Firestone's sales of foam items totaled more than $140 million in retail value during 1951 to 1957, the government added. Neither firm has commented on the suits.

Ware Chemical Appoints Agents

► Ware Chemical Corp., Westport, Conn., has announced that R. M. Ferguson & Co. has been appointed its agent in Canada for its line of Prespersions and R. E. Carrol, Inc., Trenton, N. J., will represent the firm in the middle Atlantic states.

Robert H. Kellar

Wins RUBBER AGE Award

► The second annual RUBBER AGE award for the best work during the year in rubber technology courses sponsored by the TLARGI Rubber Technology Foundation at the School of Engineering, University of Southern California, has been presented to Robert H. Kellar of the B. F. Goodrich Co., Los Angeles, Calif., for his work during the 1958-59 academic year. Mr. Kellar has won an honorarium in the amount of $100. Mr. Kellar was born in Minneapolis, Minn., and majored in chemical engineering at the University of Minnesota receiving both bachelor's and master's degrees. Following graduation, he spent one year with the Northwest Research Institute at the University of Minnesota. He spent the next four years in the employ of the Columbia - Southern Chemical Corp. in Barberton, Ohio. Mr. Kellar then joined the b. F. Goodrich Co., with which he has been associated for the past fifteen years. The award, established by RUBBER AGE at the University of Southern California, is similar to one in effect for the past several years at the University of Akron.

Holds Interest in Australian Unit

► Goodyear Tyre & Rubber Co. (Australia) Ltd. has acquired a substantial interest in a new synthetic rubber plant being built by the Australia Synthetic Rubber Co. Ltd. Located at Altona near Melbourne, the plant will have an annual capacity of 30,000 long tons of styrene-butadiene rubber and is scheduled for completion in July, 1961. It is expected to cost more than $11 million. This new synthetic plant is part of the Australian Commonwealth's $50 million petrochemical project which is being built by Vacuum Oil Col., Pty., Ltd.

Russian Tire Factory to Utilize British Equipment

► A tire factory is now under construction at Dniepropetrovsk, Russia, which will utilize about £14 million worth of equipment to be supplied by Rustyfa, a consortium of British firms. The facility will consist of a manufacturing unit, an administrative office building, service buildings, and a 326,000 square foot building to accommodate stocks of raw materials and finished goods. Scheduled to produce 2,000,000 tires a year, the plant is expected to begin production in 1960.

The 1,170 foot long and 570 foot wide factory building will be located on a 79 acre site. Highly mechanized, it will operate on a continuous and directional flow basis. Tire test machinery will provide for routine and development testing and equipment will also be installed for various control laboratories. A mill room section, occupying three floors, will house an automatic powder handling system. The remainder of the building will vary in height in accordance with processes conducted in each section.

Thirteen mixers will be installed, four of which will be large mixers driven by 1,500 hp synchronous electric motors and nine will be driven by 1,000 hp motors of the same type. An extensive overhead conveyor system will carry bales of various rubbers from the stores building to the mill room. Carbon black and other powders, which will be stored in the raw materials building, will also be automatically conveyed to the point of usage.

Rubber mixtures will be continuously processed by a series of strip conveyors which will deliver hot, mixed rubber from the roller mills for distribution to the calender tread or tube extruders. Two large fabric dipping, drying and tensioning units will be utilized to treat fabrics. After completion, uncured tires will be conveyed to the inspection point, then painted and delivered to vulcanizers. Vulcanization will take place in Bag-O-Matic presses. Another feature of the Russian plant will be a control system which will automatically record production of various codes of mixing, types of fabrics, and tires and tubes produced.

Harchem Issues Product Bulletin

► Harchem Division, Wallace & Tiernan Inc., Belleville, N. J., has issued a six page product bulletin on its polyester type plasticizer, "Harflex 330." According to reports, this plasticizer lends permanence to vinyl compounds that would also be resistant to migration into lacquers, varnishes and polystyrene. Its low volatility and low extraction properities are excellent and its electrical properties are also very good, the company states.

Canadian News

► Polymer Corp., Ltd., and Local 16-14 of the Oil, Chemical and Atomic Workers Union reached settlement on June 23 of a strike at the company's synthetic rubber plant in Sarnia, Ont. During the 97 day strike, in which both monetary and non-monetary items were in dispute, 1850 employees each lost an average of $1400 in wages.

The one year settlement provides an across the board increase of 9c per hour. The Union had demanded a 10 per cent increase, or 22.5c an hour. Three weeks' vacation after ten years of service will begin in 1960. Shift differentials have increased by 1c per hour for afternoon shifts and 2c per hour for night shifts, to 8c and 16c respectively.

On March 17, the day before the walkout, the company had offered 6c per hour across the board wage increase and the vacation and shift differential clauses that were finally accepted. Retroactive adjustment was calculated on the basis of 6c per hour for the period of January 1, 1959, to March 18, 1959, with a maximum of $28.

The contract provides the same degree of union security as existed in the expired contract although the Union sought a Union Shop. A provision for deduction of union assessments was dropped from the contract. There was no change in the no strike-no lockout clause. Two major issues of contention were contracting out of work and trades recognition. The company sought modifications to improve flexibility and efficiency in the use of manpower.

Modifications incorporated in the contract accomplished these objectives, providing assurances to the employees that the flexibility would not be used to lay off employees or to destroy the distinguishing features of trades. A detailed job progression schedule was also worked out on the principles of ability and seniority which had been established in earlier contracts. About twenty other monetary demands were dropped by the Union during the later stages of negotiation.

The strike was the first in the 17 year history of the Crown-owned Polymer Corp. It was not believed at first that it would actually take place and even after shutdown operations began, there was wide-spread belief that the Federal government would intervene Dr. E. R. Rowzee, president of Polymer, outlined the company's stand in an open letter to the people of Sarnia three weeks after the strike began. He said the company was prepared to resume negotiations, but its offer of a package settlement on March 17 was final. This offer had been flatly rejected by the Union.

Union members set up a two-boat daytime patrol to prevent river supplies from reaching the company and were expected to extend this picket to a round-the-clock basis. Pickets were also maintained outside the company's main gates. The strike seriously imperiled Sarnia's economy and a group of strikers' wives was organized in opposition to the Women's Auxiliary to Local 16-14. Called the Freedom Club, this group criticized union action and described union bargaining committee officials as "punch drunk with power." Another blow was a warning to watch for an increase in price on almost everything made from rubber, natural or synthetic. The price rise was expected to come as a direct result of a 23 per cent increase in natural rubber prices.

According to current reports, the strike resulted in heavy losses for Polymer. The company was said to have lost out on current markets and would also have to face a tough fight to regain all its export markets. Long established overseas customers, which represented some ⅔ of Polymer's business, were swinging their orders to other foreign suppliers. In Canada, the big tire-makers and other rubber purchasers filled their demands from United States plants.

After two months, there was still no break in sight on the Polymer strike and the Federal government's mediator withdrew from negotiations because of the uncompromising attitude of the disputants. The company and Union began to approach settlement in about the middle of June, when two major issues were settled: the matter of "contracting out work" by the company and that of trades recognition.

► Firestone Tire & Rubber Co. of Canada, Ltd., has initiated a new multimillion dollar expansion program which will include construction of a new tire manufacturing plant to be located in western Canada. The company also plans to modernize its present Hamilton, Ont., installation. Firestone has taken an option on a 50 acre site in Calgary, Alberta, and now has studies underway to determine if the site meets all necessary requirements. Company experts are also pursuing similar studies in other western provinces before a final selection is announced. Construction of the new plant will begin within a short time after the selection is final.

The new facility is scheduled to go into production in late 1960. Expected to be the most modern and best equipped plant in the Canadian rubber industry, production plans call for a full line of passenger, truck, bus, farm and implement tires. Expansion plans at the Hamilton plant call for immediate installation of new tire building machinery and curing equipment. Additional warehouse space will also be erected this year.

► Goodyear Tire & Rubber Co. of Canada Ltd. has announced that sales in the first five months of 1959 were 18 per cent above those of 1958 and net income was "substantially higher" than that of last year. Net income for 1959 is expected to be about 20 per cent ahead of 1958, which would put the 1959 net income at about $4,600,000, or $16.90 per share, after preferred dividend requirements, compared with $3,864,241, or $13.92 per share, for the year ended December 31, 1958. Although there was an 18 per cent sales gain to the end of May, it is doubted that sales will hold quite at that level for the full year. The company expects to end the year with about a 10 per cent sales gain over 1958. Sales figures have not been released.

Goodyear has also announced plans to build a new plant in western Canada which is expected to cost $6 to $7 million. The plant will first produce a full line of tires and may later be expanded to produce conveyor belts, foam rubber, hose and other items that it now makes in its eastern plants.

L. E. King

Promoted by Sid Richardson

► Sid Richardson Carbon Co., Fort Worth, Texas, has promoted L. E. King from plant superintendent to manager of its plants at Odessa, Texas. Entering the carbon black industry in 1925, Mr. King has served the company in Monroe, La.; Borger, Texas; and Odessa, Texas.

Fort Wayne Group Holds Golf Outing

► The Fort Wayne Rubber & Plastics Group held its 8th annual summer golf outing on June 5, at the Tippecanoe Country Club, Leesburgh, Ind., with 348 members and guests present. A smorgasbord dinner of shrimp, ham and roast beef was served during the outing. Door prizes, donated by 107 contributors, were awarded to lucky ticket holders. The Outing Committee, under the chairmanship of Ed Theall (Dryden Rubber), consisted of John Porter (H. Muehlstein); John Lawless (DuPont); Jack Lippincott (Dryden Rubber); Charles Collins (Celotex Corp.); M. J. O'Connor (O'Connor & Co.); Jerry Zwick (Goodyear Chemical); Al Cobbe (Cabot Carbon); Al Robinson (Harwick Standard); B. Hutchinson (Copolymer Rubber & Chemical); and Stan Shaw (Witco Chemical).

Don Zimmerman (U. S. Rubber) was the outing's top golfer with a score of 74. He also was awarded the Goshen Rubber Trophy. Second low gross was won by Charlie Skuza (South Haven Rubber); third low gross by Milton Leonard (Columbian Carbon); and fourth low gross by Dan Lamb (Oakite), all with a score of 74. Low net was won by Joe Hanley (Vail Rubber).

Other low net prize winners were: Craig Hambridge (guest); Bud Freeland (guest); Harry Bennett (guest); R. Hulk (guest); Lou Ferdinand (R. T. Vanderbilt); Chuck Weimer (Phillips Chemical); Bill Fleshood (General Tire); W. Hammell (guest); Robert Simpson (Columbia-Southern); Paul Lantz (Syracuse Rubber); Milton Leonard (Columbian Carbon); Jerry Zwick (Goodyear Chemical); R. Waller (guest); Art Fellows (Vail Rubber); Don Zimmerman (U. S. Rubber); V. Taylor (Eastern States Chemical); J. Graff (guest); A. Wiltjer (Union Carbide); Al Larsen (guest); Ralph Johnson (Mogul Rubber); Dave Williams (Asbestos Mfg.); Dick Reiger (Bakelite); Hank Conltner (guest); Bal Connell (General Tire); Ed Davies (R. T. Vanderbilt); Frank Woznak (guest); Jim Beaker (guest); Wayne Place (Jasper Rubber); and Bob Dineen (Synco Resins).

Frank Roberts (Bauman-Harnish Rubber) won the closest-to-the-pin prize, and Bud Fidlin (guest) won second prize. Long drive was won by Harvey Cooper (guest), and Bob Schultz (guest) came in second. Fewest putts was won by Don Wogoman (Mogul Rubber) with a 26, and second prize was taken by Stan Shaw (Witco Chemical) with a 27. The Blind Bogey was won by Jim Ferker (guest); Glen Stover (Central Rubber & Steel); R. Bannon (Union Carbide Chemical); J. Taylor (Eastern States Chemical); R. Ohm (O'Connor & Co.); H. W. Hagmeyer (Owens-Corning); Bob Hinderer (Anaconda Wire & Cable); and M. Neill (guest), all with a 78.

Members and guests at the 23rd Annual Summer Outing of the Boston Rubber Group eating a lobster dinner "under the big top," at the Andover Country Club, Andover, Mass.

Boston Group Holds Outing

► Over 700 persons attended the 23rd Annual Summer Outing of the Boston Rubber Group which was held on June 19 at the Andover Country Club, Andover, Mass. Chairman of the Outing Committee was John Hussey (Goodyear). He was assisted by George Hunt (Simplex Wire & Cable) and Harry Atwater (Malrex Chemical). Serving as sports directors were: *Softball,* Ed. Freeman (Stedfast Rubber); *Darts,* Nick Hertel (Hood Rubber); *Tub and Ball,* Henry Anthony (Tyre Rubber); *Horseshoes,* Joe Cullen (Marbon Chemical); *Golf,* Lyle Longworth (Monsanto Chemical) and Bill Platt (Columbia Southern); and *Horse Race,* Carl Myers (Jamestown Finishes). The day was climaxed by a dinner of boiled Maine lobster which was served "under the big top" according to the group's annual custom. This year the circus tent was enlarged to 40 by 140 feet. Each person attending the outing was presented with a door prize.

J. S. Bealer (guest) was the Soctex Trophy winner in the 18 hole golf tournament with a low gross of 79. Runners-up were A. Nelson (Compo Chemical), C. K. Mullin (C. K. Mullin) and J. Blomstrom (guest). Low net first prize went to E. McCool (Vulplex) with second, third and fourth prizes awarded to J. F. Stiff (Columbian Carbon), F. Young (Howe-French) and C. S. Ennis (group member).

Prize winners in the kickers handicap, in order of finish, were J. A. Loring (Roger A. Reed); R. Stimetz (United Carbon); C. Parisi (guest); E. Parent (Bestread Products); L. Longworth (Monsanto Chemical); E. Missback (Kolker Chemical); R. Gray (guest); W. Sheehan (Witco Chemical); R. Gimer (guest); H. Glutting (Goodrich Chemical); L. Freedman (guest); and K. Einkley (guest). S. H. Tyng (Naugatuck Chemical) won first prize for being nearest the pin at the fifth hole, with H. E. Opie (guest) taking second prize.

Most sixes prize went to P. Hastings (Kleistone Rubber) and the most sevens award went to T. Reed (Naugatuck Chemical). High gross prize winner was P. DeSantis (guest) and high net leader was C. J. Tremblay (Tyre Rubber).

In the nine hole golf tournament, J. Christopher (Borden Chemical) won low gross first prize with a score of 37. Second prize went to D. Larsen (Haartz-Mason). Low net winner was P. E. Jurley (Naugatuck Chemical) and runner-up was J. J. Breen (Barrett and Breen). G. Snow (Union Paste) took first prize in the kickers handicap, and the runners-up were D. E. Welch (Naugatuck Chemical and C. Kees (Sherwin-Williams). High gross winner was H. Jamison (group member) and high net winner was A. L. Polese (guest).

Bill McCabe (Avon Sole) won first prize in the dart tournament. Runners-up, in order of finish, were Jim Lorray (Avon Sole); Al Petrone (group member); Bob Killiam (guest); Dom Spinozzi (DuPont); and R. Gailitiz (Avon Sole).

MacGregor Sport Elects Two

► A. G. Koegel has been elected chairman and H. P. Cowen, president, of MacGregor Sport Products, Inc., Cincinnati, Ohio. Mr. Koegel, who joined MacGregor in 1929, was formerly president. His election as chairman fills the vacancy created by the recent death of Philip H. Goldsmith. Mr. Cowen, who joined the company in 1930, has been executive vice-president.

Financial News

Firestone Tire

► Six months ended April 30: Net income of $29,940,606, which is equal to $3.47 a share, compared with $21,264,-682, or $2.52 a share, in the 1958 fiscal half. Sales in the six months to April 30 totaled $568,158,972 compared with $490,854,806 in the same period last year.

Allied Chemical

► Six months ended June 30: Net income of $27,939,536, which is equal to $2.81 a share, compared with $14,-952,926, or $1.51 a share, in the corresponding period of last year. Sales and operating revenues totaled $372,-463,777 compared with $315,273,987 in the first half of 1958.

Eagle-Picher

► Six months ended May 31: Net income of $2,393,173, which is equal to $2.34 per share, compared with $918,-684, or 91c a share, in the same period of 1958. Sales in the six months ended May 31 totaled $60,575,633, compared with $46,651,151 in the first fiscal half of 1958.

Rubbermaid

► Six months ended March 31: Net income of $609,039, which is equivalent to 47c a share, compared with $464,-104, or 36c a share, in the first half of 1958. Sales in the six months to March 31 totaled $11,524,172, compared with $10,191,000 in the same period a year ago.

Triangle Conduit

► Quarter ended March 31: Net income of $601,784, which is equal to 44c per share, compared with $569,827, or 42c a share, in the same period last year. Sales in the first quarter of this year totaled $14,949,258, compared with $12,091,108 in the first three months of 1958.

Cooper Tire

► Quarter to March 31: Net income of $219,761, which is equal to 66c per share, compared with $79,779, or 24c a share in the same period of the preceding year. Sales in the first three months of 1959 totaled $7,358,712 compared with $6,132,264 a year ago.

Garlock Packing

► Five months to May 31: Net income of $685,588, which is equal to $1.39 per share, compared with $115,171, or 23c a share, in the same period last year.

Glidden

► Nine months ended May 31: Net income of $5,169,297, which is equal to $2.24 per share, compared with $3,787,433, or $1.65 a share, in the corresponding fiscal period of the preceding year. Sales in the nine months to May 31 totaled $144,430,496, compared with $157,655,173 at the same time last year.

Lee Rubber

► Six months ended April 30: Net income of $653,067, which is equal to 76c per common share, compared with $650,483, or 77c a share in the 1958 fiscal half. Sales in the six months to April 30 totaled $24,396,553 compared with $20,599,521 in the equivalent period last year.

General Tire

► Six months to May 31; Net income of $13,928,809, or $2.63 per common share, compared with $3,110,692, or 52c a share, in the same period last year. Sales in the fiscal half of 1959 totaled $305,339,274, compared with $202,228,500 in the 1958 fiscal half.

Goodall Rubber

► Three months ended March 31: Net income of $93,343, which is equal to 19c per share, compared with $63,911, or 13c a share, in the first quarter of 1958. Sales in the 1959 quarter totaled $3,032,400 compared with $2,529,410 in the first quarter last year.

Kawneer

► Three months to March 31: Net income of $233,177, which is equal to 26c per share, compared with $86,192, or 10c a share, in the same period last year. Sales in the 1959 first quarter totaled $7,596,818, compared with $6,145,197, in the same period last year.

Mansfield Tire

► Quarter ended March 31: Net income of $389,042, which is equal to 58c per common share, compared with $265,144, or 42c a share, in the same period of the preceding year. Per share earnings were computed after preferred dividend requirements.

Seiberling Rubber

► Quarter to March 31: Net income of $214,929, which is equal to 32c per share, compared with a loss of $200,-644, in the same period last year. Sales in the 1959 first quarter were $11,818,-603, compared with $9,343,477.

Witco Chemical

► Quarter ended March 31: Net income of $448,000, which is equal to 59c per share, compared with $355,900, or 58c per share, in the first three months of the preceding year. Sales in the first quarter of 1959 totaled $12,082,400, compared with $9,022,300 in the same period last year.

St. Joseph Lead

► Quarter ended March 31: Net income of $2,060,972, which is equal to 76c a share, compared with $2,424,296, or 89c a share, in the equivalent period of the preceding year. Sales in the first quarter of 1959 totaled $19,573,331 compared with $18,226,561 in the 1958 first quarter.

Belden Manufacturing

► Quarter ended March 31: Net income of $429,118, which is equal to $1.09 per share, compared with $105,-711, or 27c a share, in the same period last year. Sales in the 1959 first quarter totaled $7,148,055 compared with $5,229,951 in the first quarter of the preceding year.

New Jersey Zinc

► Three months ended March 31: Net income of $903,088, which is equal to 46c per share, compared with $49,837, or 2½c in the same period of the preceding year. Sales in the 1959 first quarter totaled $4,834,408 compared with $3,349,864 in the 1958 first quarter.

DuPont

► Quarter ended March 31: Net income of $101,645,900, which is equal to $2.17 a share, compared with a net income of $71,232,649, or $1.51, in the equivalent period of the preceding year. Sales in the 1959 first quarter totaled $514,685,724 compared with $421,919,-160 last year.

Archer-Daniels-Midland

► Nine months ended March 31: Net income of $4,341,823, which is equal to $2.70 per share, compared with $2,584,843, or $1.63 per share, in the equivalent period of the preceding year.

General Cable

► Quarter ended March 31: Net income of $1,753,048, which is equal to 58c per common share, compared with $1,635,762, or 55c a share, in the first quarter of 1958.

Raybestos-Manhattan

► Three months to March 31: Net income of $912,708, which is equal to $1.45 per share, compared with $279,-446, or 44c, in the first three months of 1958.

AU Scholarship Fund Increased

► Gifts and grants from four companies for the Akron U Associates have amounted to $93,116, the total pledged to the University of Akron for a matching scholarship fund, according to current reports. Akron U Associates is comprised of area business and industrial concerns which support the university and the $93,116 is the sum pledged to date toward a $120,000 goal. The fund was given a $35,000 boost after contributions from the Cotter Merchandise & Storage Co., the Firestone Tire and Rubber Co., Goodyear Tire & Rubber Co., and the Seiberling Rubber Co.

The National Science Foundation has also granted $8,830 to finance a 30 week in-service institute for area secondary mathematics and physics teachers, which will be directed by Dr. Mabel Riedinger, professor of education. Another grant announced recently was from the U. S. Rubber Co., which originally made a research grant of $5,000 in June 1958. The company has now increased the grant by an additional $5,000, extending it to December 31, 1959. It is to be used to support basic research in anionic polymerization under Dr. Maurice Morton.

Plans Carbon Black Plants

► Phillips Petroleum Co., Bartlesville, Okla., has announced that negotiations are being completed with Pemex (Mexico) to build a carbon black plant in Mexico. According to the company, it will invest from 10 to 15 per cent of the plant cost while the remainder will come from private Mexican capital. Pemex will supply the oil used in the plant. Phillips also announced plans to build a carbon black plant with Industrial Development Corp. of South Africa, Ltd., in South Africa. The two companies have formed a jointly owned firm, Phillips Carbon Black Co. (Proprietary) Ltd., to build and operate the estimated 22 million pounds per year capacity unit. According to reports, the plant is scheduled to be on stream within two years, and it will use Phillips' basic oil furnace-black process.

General Cable Plans New Unit

► General Cable Corp., New York, N. Y., plans to build a wire and cable plant at Quincy, Mich. Expected to cost $2,500,000 to $3,000,000, construction of the plant was to have begun in July. The unit will be 60,000 square feet with additional office space in a one-story building. Completion has been scheduled for February 1960. A company spokesman said the availability of ample skilled manpower, an abundant supply of power from Consumers Power Co., and nearness of the new plant to rapidly expanding markets of the Great Lakes Midwest region, were prime factors in choosing the Quincy site.

Collier Retires From Johns-Manville

► Simon Collier, nationally known authority in the field of industrial quality control and chairman of ASTM Committee D-11 on Rubber and Rubberlike Materials, has announced his retirement from Johns-Manville Corp., after 36 years with the company. Mr. Collier stated that he would continue to serve as chairman of Committee D-11 until February, 1960, and then he would continue to serve the committee in whatever capacity it sees fit to use him.

Mr. Collier was graduated from Worcester Polytechnic Institute with a B.S. degree in chemistry in 1916. Prior to joining Johns-Manville in 1923 as chief chemist at the company's Waukegan, Ill., plant, he served as a rubber chemist at the Boston Belting Co., and as assistant chemist in rubber at the Bureau of Standards. In 1936, Mr. Collier became manager of inspection control for Johns-Manville. He was appointed director of quality control in 1946, and was responsible for raw material and production standards affecting more than 500 different lines of products.

He is a member and former director of the American Society for Testing Materials, and has for many years been chairman of that organization's Committee

D-11 and Committee E-11 on Quality Control, and secretary of Committee C-17 on Asbestos Cement Products. Mr. Collier is a past-chairman of the New York Rubber Group and a former member of the board of directors of the Rubber Division of the American Chemical Society. He is a member of the Chemists Club of New York City and the American Institute of Chemists. Mr. Collier is a founding member of the American Society for Quality Control and has served in several capacities including executive secretary, 1948-1951; vice-president, 1951-1952; and president, 1952-1953.

Names Pittsburgh Distributor

► Minerals & Chemicals Corp. of America, Menlo Park, N. J., has named Van Horn, Metz & Co., Inc., New Kensington, Penna., as Pittsburgh area distributors for its complete line of inert minerals. According to the company, the new distributor will maintain warehouse stocks of its products, which include aluminum silicate pigments and Attapulgus clays used in the manufacture of rubber, paints, plastics, inks, adhesives, fertilizers and other chemical materials, to serve customers in western Pennsylvania and northern West Virginia.

Pawling Rubber Has Anniversary

► Pawling Rubber Co., Pawling, N. Y., celebrated its fifteenth anniversary during the week of June 1, by holding an open house for employees and residents of the Pawling community. Visitors were given a conducted tour through all the production facilities. The open house also featured a display of the many products using Pawling Rubber materials.

DuPont Plans New Unit

► E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., plans to build a plant at Memphis, Tenn., to produce acrylonitrile, a key raw material for its Orlon acrylic fiber. The multi-million dollar project will be located adjacent to existing DuPont facilities at Memphis. This plant is scheduled for completion late in 1960 and will produce part of the acrylonitrile requirements of the company's Textile Fibres Department. Acrylonitrile will be produced by a company-developed process using hydrogen cyanide and acetylene. Existing facilities for hydrogen cyanide, now made at the Memphis plant from ammonia and natural gas, will be expanded. Acetylene requirements will be purchased.

Rubbermaid Appoints Andreas

►Rubbermaid Inc., Wooster, Ohio, has named James R. Andreas to the position of marketing and advertising administrator. Mr. Andreas formerly was assistant purchasing agent for the company.

West Coast News

► The Los Angeles Rubber Group held its 1959 summer outing at the Stardust Coliseum Hotel in Las Vegas, Nev., on June 12 to 14. The outing included golf tournaments, sports events, dinner and a stage show, brunch and the award of prizes. The group also made special arrangements for a Hoover Dam tour.

Summer outing committeemen included: *Co-Chairmen,* B. R. Snyder (Vanderbilt) and C. F. Ashcroft (Cabot); *Ticket Sales Chairman,* T. B. Keenan (Plastic and Rubber Products); *Transportation Chairman,* G. R. Steinbach (Merit Western), assisted by M. A. MacDonald (Midwest Rubber Reclaiming); *Housing Chairman,* A. R. Plank (Fargo Rubber), assisted by C. S. Hoglund (R. D. Abbott); *Sports Activities Chairman,* C. R. Alexander (Industrial Rubber Cement), assisted by Roger Murphy (Citizens' National Bank) and W. A. Essex (Atlas Sponge Rubber); *Hoover Dam Tour,* Richard Wells (Firestone); *Golf Tournament Chairman,* Leo R. Wood (Tri Angle Tool & Machine Works); *Prize Committee Chairman,* C. E. Hart Midwest Rubber Reclaiming); *Reception Committee Chairman,* W. F. Kearney (Firestone).

Men in charge of sports events included *Shuffleboard,* Claude Morrison; *Ping Pong,* Perry Conkle; *Horseshoes,* James H. Jones; *Tennis,* Al Federico; *Beer Drinking Contest,* John W. Arensmeyer; *Casting,* W. E. Alexander; *Baseball Toss,* Wes Essex; *Darts,* James Warner; *Pitch Golf,* Gene Pike; *Egg Toss,* Roger Murphy; and *Swimming,* Fred Owens.

► Pacific Moulded Products Co., Los Angeles, Calif., has purchased all of the outstanding stock of W. B. Elfstrom Co., Inc., also of Los Angeles. Elfstrom will operate as a subsidiary of Pacific Moulded with K. R. Simpson, Jr., president of Pacific Moulded, as chairman and president; T. L. Tafe, vice-president of Pacific Moulded, as vice-president and general manager; Ray Lavalette as vice-president and sales manager; and Homer Shambaugh as secretary and treasurer. Directors of the firm will be Mr. Simpson, Mr. Tafe, W. B. Elfstrom, Mr. Lavalette and Mr. Shambaugh.

Pacific Moulded produces rubber component parts for aircraft, electronic and appliance manufacturers throughout the United States and manufactures and markets its own proprietary lines of rubber impellers for industrial and marine pumps as well as packers for the oil field industry. Elfstrom manufactures and markets nationally a complete line of rubber replacement service parts for all leading brands of commercial and household washing machines. Pacific Moulded expects the acquisition of Elfstrom to broaden its line of proprietary products and to put its consolidated volume over $3,000,000 annually.

► Dan W. Walsh, Pacific Coast sales manager for the Tire Division of the U. S. Rubber Co., has retired from active service after nearly 30 years with the firm. Mr. Walsh attended the University of Wisconsin and received a B.A. degree in 1916. During World War I, he served in the U. S. Marine Corps and afterwards, returned to the Certainteed Products Corp. Later, Mr. Walsh joined the Barrett Co., a roofing and paving firm in New York City.

In 1931, Mr. Walsh went to Des Moines, Iowa, as a district sales manager for U. S. Rubber. He has served the firm as district manager in Detroit and Cincinnati; division manager in Kansas City; and Pacific Coast sales manager. At the advent of World War II, he was transferred to New York, returning to the Los Angeles tire plant as Pacific Coast sales manager in 1945.

► James T. Modawell has been promoted to sales manager for the C. P. Hall Co. of California, while Charles E. Lake has been named a technical representative covering the Southern California territory. For the past eleven years, Mr. Modawell has served as office manager and technical representative. He completed the graduate rubber technology course at the University of California and is a member of the Los Angeles Rubber Group, Inc. Mr. Lake completed his schooling at Compton College and the University of Southern California, graduating with a B.S. degree in chemical engineering. As an undergraduate, he took courses in rubber technology sponsored by Tlargi. He is an active member of that group.

► The 25 Year Club of the Los Angeles tire plant of the U. S. Rubber Co., recently held its annual dinner meeting at a local country club. Principal speaker was E. A. Luxenberger, vice-president of the rubber company and group executive responsible for the operation of the Tire, Footwear and General Products, and Mechanical Goods Divisions of the firm. During the meeting, officers for the coming year were elected including William Chinn, *President;* Joseph Dyer, *Vice-President;* and Alberta Morrow, *Secretary-Treasurer.*

James E. Kennedy

Named to New Rubbermaid Post

► James E. Kennedy, manager of production control and raw materials at Rubbermaid Inc., Wooster, Ohio, has been named to the newly created position of production manager. In addition to his former duties, he will now be responsible for the direction and operation of all manufacturing, including stock preparation and molding, finishing, warehousing, shipping, traffic, wire and plastics. Mr. Kennedy joined Rubbermaid as a compounder in 1949. In 1950, he was promoted to foreman in the Wire Department and later to production control as a scheduler before being promoted to department manager in 1954. A graduate of the College of Wooster, he served in the Naval Air Corps during World War II.

► Pacific Coast Chemicals Co., Berkeley, Calif., has been named by the J. M. Huber Corp. as exclusive distributor for its kaolin clay extenders and Zeolex synthetic silicate pigments to the paint, varnish, printing ink, plastics and specialty processing industries in Northern California. Warehouse stocks will be maintained for less-than-carload customers. Huber raw materials will complement other supplies Pacific Coast Chemicals now carries to service these industries.

► Stoner Rubber Co., Anaheim, Calif., has announced the promotion of Finley B. Riggs as executive vice-president and Fred Lehman as vice-president in charge of sales.

► Russ Kettering has been appointed technical director at the Oliver Tire & Rubber Co., Oakland, Calif., and Ralph Hickcox has been named technical assistant to the president.

► John Kempf, formerly with U. S. Stoneware, Akron, Ohio, is now on the technical staff of American Latex Products Corp., Hawthorne, Calif.

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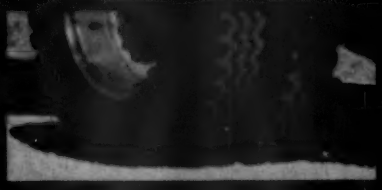


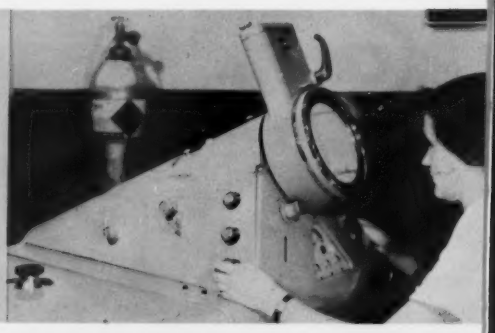
Furnex® SRF means optimum balance all the way!

TURN PAGE

Because COLUMBIAN goes all the way

in RESEARCH .....

Columbian's laboratories have developed many "firsts" in the endless search to make carbon blacks that meet the most exacting specifications. Typical is Columbian's contribution in determining the micromorphology of carbon-reinforced rubber. The *first* electron microscope in North America was built by Columbian to see and measure the size of carbon black particles . . . leading to an entirely new concept of structure—a major tool today in carbon black evaluation.



in PRODUCTION .....

Columbian has pioneered many new methods of precise production control . . . to provide uniformity bag after bag, carload after carload. In addition, Columbian offers a wide range of blacks to match any requirement where rubber with special characteristics is desired . . . a range of blacks that assures superior results in end products.

in TECHNICAL SERVICE

For years, Columbian's Technical Service has been considered outstanding in the industry . . . is always available to study any phase of production . . . to contribute workable, practical ideas that can lead to greater economy, efficiency and improved products. Backed by the most modern laboratories and unequalled field experience, Columbian's Technical Service is a potent reason for specifying Columbian carbon blacks!

Columbian has a carbon black for every need...

STATEX®-160 SAF Super Abrasion Furnace
STATEX-125 ISAF Intermediate Super Abrasion Furnace
STATEX-R HAF High Abrasion Furnace
STANDARD MICRONEX® MPC Medium Processing Channel
MICRONEX W-6 EPC Easy Processing Channel
STATEX®-B FF Fine Furnace
STATEX-M FEF Fast Extruding Furnace
STATEX-93 HMF High Modulus Furnace
STATEX-G GPF General Purpose Furnace
FURNEX® SRF Semi-Reinforcing Furnace

COLUMBIAN CARBON COMPANY
380 MADISON AVENUE, NEW YORK 17, N. Y.
Branch offices and agents in principal cities

Herbert H. Fink

Named Development Vice-President

► Herbert H. Fink has been named vice-president of development for the B. F. Goodrich Industrial Products Co., a division of the B. F. Goodrich Co., Akron, Ohio. Mr. Fink joined Goodrich in 1933 as a production worker in the Molded Goods Department and became a product engineer in that department three years later. In 1944, he was named technical manager of suspension design including Torsilastic rubber springs, motor mountings and vibro insulators. He returned to the Molded Goods Department as technical manager of belting. In 1956, he became manager of hose technical activities, including development and field engineering.

Born in Wheeling, West Va., Mr. Fink received a degree in civil engineering from the University of Akron in 1933. He is a member of the Akron Chapter of the Ohio Society of Professional Engineers, the Society of Automotive Engineers and Ordnance Advisory Committee on Mechanical Rubber Goods. During World War II, he served on SAE-ASTM Technical Committees on Automotive Rubber Products, the RMA Technical Committee on Molded, Extruded, Lathe Cut and Sponge Rubber Products; and the ASTM Sub-Committee on Rubber Products.

Marbon Appoints Erwin

► Kenneth A. Erwin has been appointed administrative manager for the Research and Development Department of the Marbon Chemical Division of Borg-Warner Corp., Washington, West Va. Mr. Erwin holds a B.S. degree in chemistry from Norwich University and an M.B.A. degree from the University of Louisville. For the past eleven years, he has been associated with the General Electric Co., serving in laboratory, administrative and engineering capacities. Mr. Erwin has been a national director for the Society of Plastics Engineers, a past president of the Society's Kentuckiana section, and is also an active member of the American Chemical Society.

No. 4 Stewart Bolling Spiral-Flow Intensive Mixer with 350-h.p. anti-friction helical geared compound type drive.

Thanks to Important Basic Patents,

Bolling SPIRAL-FLOW Intensive Mixers Offer Advantages Obtainable Nowhere Else

AVAILABLE FEATURES:

Variable friction ratios

• • •

Choice of 3 types of drives

• • •

Choice of 3 types of discharge doors

• • •

Chrome-plated interiors

Stewart Bolling

The latest Stewart Bolling patent covers our strip dust seal, copper with lubricant or Nylon without lubricant. We believe this seal to be the *least expensive* and longest wearing in the world. Patented also: the well known Spiral-Flow sides, and interchangeable front-to-back rotors with full-circle end flanges. Likewise exclusive: the Bolling Ultra discharge door, which we believe to be the *least expensive* in its field, as well as the fastest and most positive in opening and closing.

All this is evidence that Bolling Spiral-Flow Intensive Mixers are not reworked rubber machines. Instead, they were designed for processing virgin plastics—for high speeds, high pressures and fast cycling. We believe that they have never been approached in dispensing capacity and long life.

Stewart Bolling Spiral-Flow Mixers are available in Europe, built by an old and honored firm, Fawcett-Preston, Bromborough, England.

Stewart Bolling
& Company, Inc.

Ask for our well illustrated 12-page Bulletin 59.

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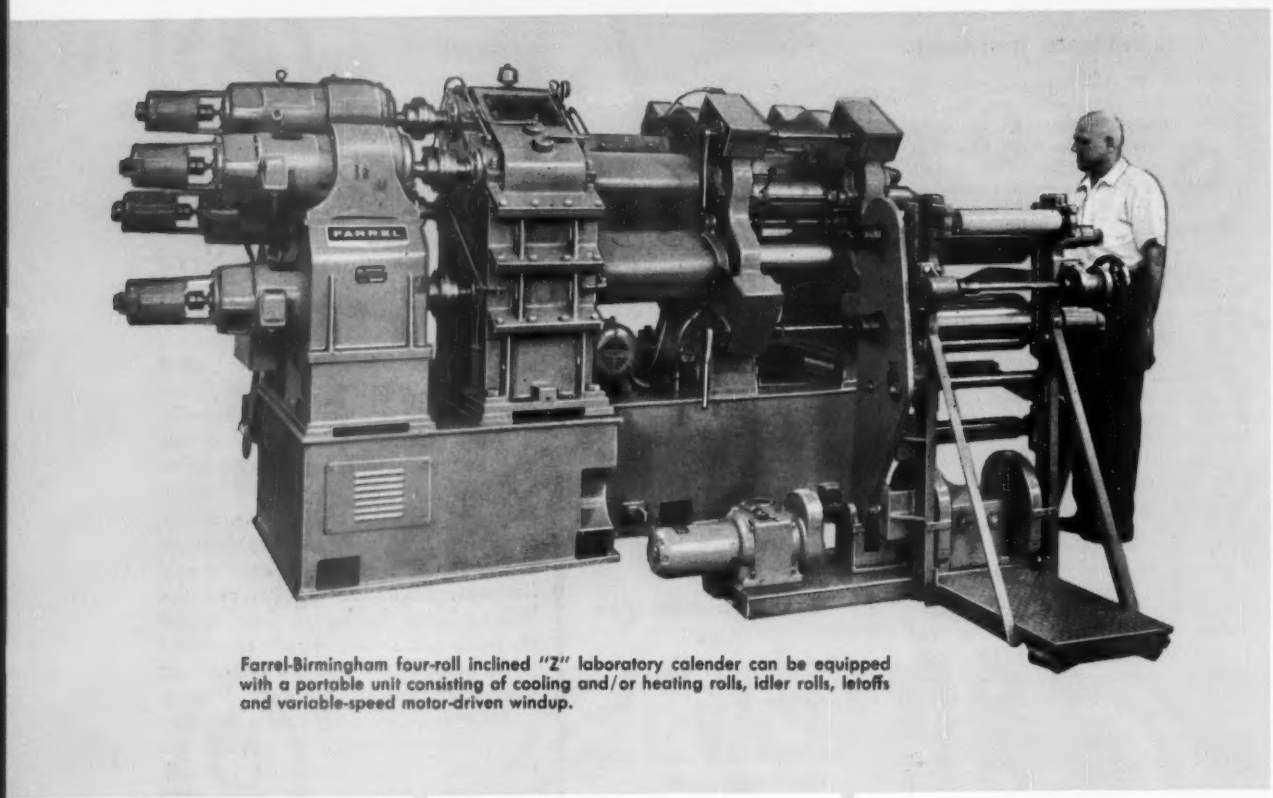
Designers and Builders of Machinery for the Rubber and Plastics Industries

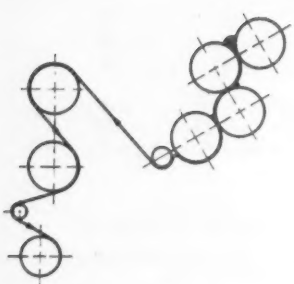
Intensive Mixers • Calenders • Mills • Refiners • Crackers • Dust Grinders • Sheeters
Hydraulic Presses • Pump Units • Accumulators • Elevators • Bale Splitters • Vulcanizers
Speed Reducers • Gears • Extruders

modern laboratory equipment

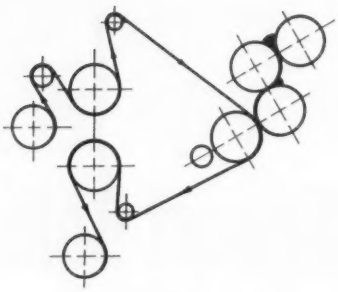
permits broad scope of experimental work



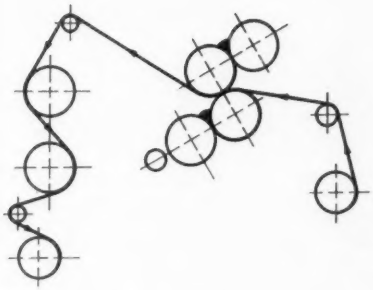
Farrel-Birmingham four-roll inclined "Z" laboratory calender can be equipped with a portable unit consisting of cooling and/or heating rolls, idler rolls, letoffs and variable-speed motor-driven windup.



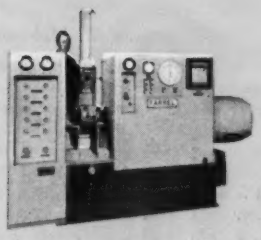
Film and sheeting



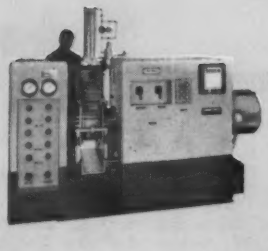
Single coating or frictioning



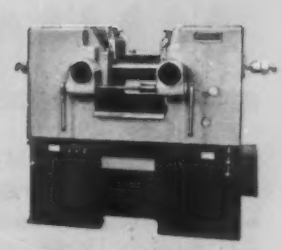
Double film and sheeting or double coating



Size B laboratory Banbury has spherical roller bearings for rotor shafts, new swing-side locking device and four-speed motor. Automatic dust-stop lubricator and piping are enclosed within the housing.



Size 00 machine is like size B, except it has air-operated swing sides and two-speed motor. Both machines have chrome-plated rotors, floating weight and end frames, and hoppers and sides have stainless-steel surfaces.



8" x 16" two-roll mill designed for temperatures up to 350°F. Each roll is driven by a 10 HP, AC motor through vari-pitch pulleys which give any friction ratio desired from even speed up to 1.9:1.

During the 40 years Farrel-Birmingham has maintained a process laboratory for the development of new products and techniques, the company has acquired vast experience in the design and manufacture of laboratory equipment to meet customer requirements.

Representative of this truly modern line is the 8" x 16", four-roll, inclined "Z" calender pictured at the left. Designed for a variety of calendering operations (see diagrams), this machine has maximum roll speed of 48 feet per minute, and maximum operating temperature of 500°F. Each roll in the calender is driven by an adjustable-voltage direct-current motor, providing great flexibility with roll surface speeds ranging from 6 to 48 feet per minute.

In general, Farrel laboratory equipment offers a wide range of speeds, temperatures and pressures. This permits experimental work of broad scope... and accurate evaluations...eliminating the need for single-purpose equipment of conventional design.

Send for further information about any of the machines illustrated.

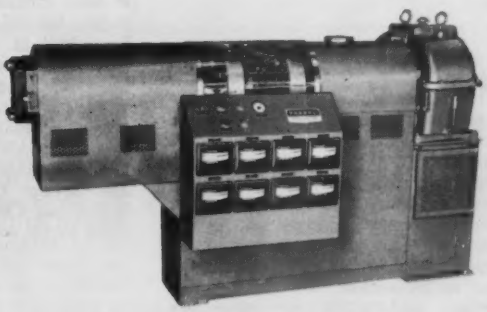
FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONNECTICUT

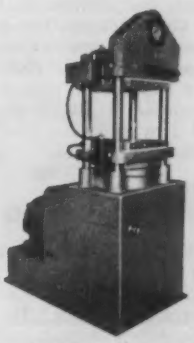
Plants: Ansonia and Derby, Conn., Buffalo and Rochester, N. Y.
Sales Offices: Ansonia, Buffalo, Akron, Chicago, Ann Arbor (Mich.), Los Angeles, Houston, Atlanta

FB-1174

FARREL®

This 3½" Inductomatic extruder has 20:1 length-to-diameter ratio, four cylinder heat zones and one headgate heat-control zone. Operates on either 240 or 480 volts and has maximum demand of 27 kilowatts on the cylinder. Heat-up time to 400°F is 27 minutes. Will operate at a maximum screw speed of 100 RPM.





50-ton hydraulic press with hot plates and timers.

Obituaries

Daniel E. Douty

► Daniel Ellis Douty, former board chairman of the United States Testing Co., Inc., died on June 24 at his home in Englewood, N. J. He was 87 years old. A native of Omro, Wisc., Mr. Douty received a B.S. degree at the University of Washington and afterwards, became a teacher of physics and instructor and tutor at several universities. From 1901 to 1903, he served as deputy supervisor of the Seattle High Schools. In the latter year, he was named assistant physicist of the U. S. Bureau of Standards, and later became an associate physicist with the bureau.

Mr. Douty left government service to become a vice-president of United States Testing in 1912. In the 1920's, he was general manager for the company. During that period, he also represented the Silk Association of America. Mr. Douty served as president of United States Testing from 1934 to 1947 and as chairman of the board from 1947 until about a year ago. At the time of his death, he was a director of the company.

In 1952, Mr. Douty received the first bronze plaque of the New York Board of Trade for his work in the application of science to the textile industry. He was also the recipient of many other honors including the Order of the Crown of Italy, which was bestowed upon him in 1931 for his aid in the revival of Italy's silk trade. He was a member of several well known scientific groups and associations.

John G. Welsh

► John G. Welsh, a General Tire and Rubber Co. executive, died suddenly on June 8 in Pittsburgh, Penna. He was 44 years old. Mr. Welsh was manager of passenger tires sales for the Campbell Division of Hawkinson Treads, Inc., Pittsburgh area distributor for General Tire. He was a territory salesman for the Akron Division of General Tire from 1949 to 1951 and later became the division's car dealer salesman. Mr. Welsh also served General Tire in Kansas City, Kansas, and Philadelphia, Penna.

Merle T. Christy

► Merle T. Christy, a sales representative for the A. Schrader & Son Co., died on June 10 at Akron General Hospital after a brief illness. He was 68 years old. Mr. Christy, a native of Clyde, Ohio, was a graduate of the Ohio Northern University. He is survived by his wife and a daughter.

Harry H. Thompson

► Harry H. Thompson, chief chemist of Xylos Rubber Co., Los Angeles, Calif., died on May 10 in Los Angeles, where he planned to attend the meeting of the Division of Rubber Chemistry, A.C.S. Mr. Thompson was born in Bellaire, Ohio and received his formal college education at Ohio State University, graduating in 1917 with a degree in chemical engineering. In 1919, he worked for the Research and Development Unit of National Carbon, Division of Union Carbide, as a works chemist. In 1930 he went into business for himself in Medina, Ohio.

Several years later Mr. Thompson joined Goodyear Tire & Rubber Co., as a chemical engineer in its chemical plant engaged in making Captax. In 1947, he moved to California and went to work for the Xylos Rubber Co., Division of Firestone Tire & Rubber Co., where he was employed until his death. He was listed in *Who's Who of Commerce and Industry* and in *Who's Who in the Pacific Coast*. Mr. Thompson was the co-author of numerous patents, principally on the reclaiming of rubber, and also in the development of dry cells. He was a member of The Los Angeles Rubber Group, and served as a director in 1953.

John B. Hendrickson

► John B. Hendrickson, chairman of the board for Welding Engineers, Inc., Norristown, Penna., died on May 1 at the Chestnut Hill Hospital after a short illness. He was 61 years old. A graduate of Cornell University, Mr. Hendrickson founded the welding company in 1925. He was also an inventor and held many patents in metalworking. Mr. Hendrickson was a member of the Society of the Plastics Industry, the American Institute of Shipbuilding and the Pennsylvania Manufacturers Association. Surviving are his wife and a son.

Horace G. Miller

► Horace G. Miller, managing director at the Christchurch, New Zealand, plant for the Firestone Tire & Rubber Co., died on May 27. Mr. Miller attended school in Akron, Ohio, and started with Firestone's Export Department in 1916. He later became manager of the Export Credit Department and then assistant export manager. In 1930, he went to Wellington, N. Z., as regional director and when the company's Christchurch plant was opened in 1947, he became managing director there. He is survived by his wife, two daughters and a son.

James H. Hibben

► James H. Hibben, chief of the Chemical Division of the Tariff Commission and one of the foremost chemical consultants in the United States, died suddenly at George Washington University Hospital on June 15. Dr. Hibben received a B.S. in 1920 and an M.S. in 1922 from the University of Illinois and a D.Sc. in 1924 from the University of Paris. He has been a Fellow of the International Education Board at Paris, a National Research Fellow at Princeton University, consultant to the Bureau of Standards and to various chemical industries, and a member of the research staff of the Geophysical Laboratory of the Carnegie Institution of Washington. During World War I, Dr. Hibben served in the U. S. Army with the A.E.F.

Dr. Hibben joined the U. S. Tariff Commission in 1939 as chief of the Chemical Division. In this post, he provided basic and authoritative information to the Commission, to top ranking government agencies and officials, executives in industry and to members and committees of Congress and the Office of the President on matters relating to U. S. Tariffs and foreign trade pertaining to chemicals and chemical products. During World War II, he was chairman or member of many intra-agency committees and commissions.

Dr. Hibben was directly responsible for the organization and publication of the Tariff Commission's annual report on "Synthetic Organic Chemicals, U. S. Production and Sales." He was also the author of several books and many papers. One of his best known works was a book entitled "The Raman Effect and Its Chemical Application." Dr. Hibben was a member of the Washington Academy of Sciences, the New York Academy of Sciences; the Cosmos Club; the American Chemical Society; the Chemical Society of Washington; Sigma Xi and Sigma Chi; and a former Fellow of the American Institute of Chemists. He is survived by his wife and a daughter.

John A. Martin

► John Alexander Martin, rubber controller for the Canadian government from 1941 to 1947 and a former vice-president of the Dominion Rubber Co., Ltd., died recently at his home in Waterloo, Ontario. Mr. Martin was also vice-president and director of The Equitable Life Insurance Co. of Canada; a director of the Waterloo Trust and Savings Co., and a director of Smiles and Chuckles, Ltd. He is survived by his wife and two sons.

Stuart B. Molony

► Stuart B. Molony, consulting engineer for the rubber industry with offices in Conshohocken, Penna., died on March 26. He was 83 years old.

Nick Marcu (Johnson Rubber) left, receiving his trophy as winner of the Decathlon Contest from George Hackim (General Tire) right, chairman of the Akron Rubber Group, while Milton Leonard (Columbia Carbon) center, vice-chairman of the group, looks on.

1150 Attend Akron Outing

► A turnout of 1,150 persons attended the summer outing of the Akron Rubber Group, which was held on June 19 at the Firestone Country Club in Akron, Ohio. The day's activities included a golf tournament with 295 participants, and a decathlon contest with 225 entries. General chairman for the outing was R. R. Hickernell (Monsanto). Francis W. Burger (Phillips Chemical) served as chairman of the Prize Committee, whose members were Ralph Anderson (B. F. Goodrich), H. D. Ruth (J. M. Huber), W. S. McCormick (General Tire), and C. R. Simpson (Harwick Standard).

Members of the Golf Committee were Mike Gobush (Monsanto), chairman; William C. Foster (Mobay Chemical), James Andreas (Rubbermaid), Daniel J. Choven (Witco Chemical), Lawrence Fuller (J. M. Huber), Gilbert D. Gingold (Sid Richardson Carbon), Stewart Clary (Goodyear), and Hank E. Pence (St. Joseph Lead). The chairmen of other committees included: *Food and Location*, L. V. Cooper (Firestone); *Decathlon Contest*, Maynard Bobbitt (Firestone); *Publicity Committee*, George Popp (Phillips Chemical); *Ticket Committee*, V. F. Springer (B. F. Goodrich); and *Membership Committee*, Charles W. Stalker (General Tire).

Winners in the golf tournament were: *Low Gross*, J. Cseh (Firestone); *Longest Drive*, V. Musser (Seiberling); and *Nearest the Pin*, A. Pedrose (Seiberling) and H. Miller (group member).

N. Marcu (Johnson Rubber) was the trophy winner of the Decathlon Contest, which consisted of the following events: Sand Trap Shot; Putting; Approaching Contest; Football Throw; Darts; Softball Pitch; Basketball; Ring Toss; Coin Tossing; and Horseshoes. The runners-up were E. Reinbold (General Tire) and T. Kennedy (Rubbermaid).

The day's activities were brought to a close with a dinner under a big top tent, at which time 500 door prizes were distributed.

Staley Acquires UBS

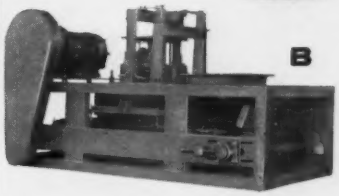
► Stockholders of UBS Chemical Corp., Cambridge, Mass., have voted to authorize the acquisition of UBS by the A. E. Staley Manufacturing Co., Decatur, Ill., through the exchange of 1¾ shares of UBS for each Staley share. This acquisition is expected to add impetus to Staley's research and polymer chemicals and to aid in the growth and diversification of its product line. Initially, UBS will continue to operate as an autonomous unit with Paul W. Atwood continuing as its president.

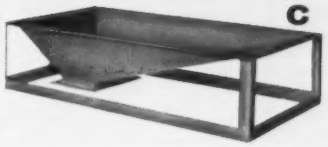
Armstrong Bargains as Unit

► The first multi-plant contract negotiations between the United Rubber Workers Union and the Armstrong Rubber Co. opened in New Haven, Conn., on June 25, when four local unions met with the company in negotiations covering some 2500 workers. Previously, each local union bargained with the firm on a local plant basis. The talks, which covered all contract provisions except wages, involved plants in West Haven, Conn.; Des Moines, Iowa; Norwalk, Conn.; and Natches, Miss.

UNITIZED
WEIGHER-FEEDER

Building-block design gives custom-made utility at an off-the-shelf cost





UNITIZED construction makes the W-C Weigher-Feeder readily adaptable to practically any processing setup. Components are standardized, proven and interchangeable . . . pre-engineered with virtual "plug-in" simplicity.

A The UPPER FRAME controls material input, is supplied with a rotary feeder, sliding gate, vibratory feeder or other mechanism matched to material and flow requirements.

B The CONVEYOR FRAME, where material is weighed, includes a complete conveyor section, weighing pan and transmitter with integral tare adjustment. W-C's system of flexure mountings assures accurate measurement despite uneven loading or pile-ups. There are no knife-edges, beam pivots or other points of concentrated wear to affect accuracy.

C The LOWER FRAME is optional; can be a simple chute as shown.

In addition, the W-C Weigher-Feeder is designed to handle such instrument-controlled functions as flow totalizing, recording, programming, and material proportioning. Units are also available for installation on existing conveyors.

Complete information is given in Catalog 12. Write for a copy

W-C

S.A. 1607

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206-5 Lincoln Ave., Hatboro, Pa.

VULCANIZED VEGETABLE OILS

rubber substitutes

THE CARTER BELL MFG. CO.
SINCE
CARTER BELL PRODUCTS
1903
SPRINGFIELD, NEW JERSEY

Types, grades and blends for every purpose, wherever Vulcanized Vegetable Oils can be used in production of Rubber Goods—be they Synthetic, Natural, or Reclaimed.

A long established and proven product

THE CARTER BELL MFG. CO.
SPRINGFIELD, NEW JERSEY

Represented by
HARWICK STANDARD CHEMICAL CO.
Akron, Boston, Chicago, Los Angeles, Trenton, Albertville, (Ala.), Denver, Greenville, (S.C.)

Overseas

Canberra—B. F. Goodrich Chemical Co. plans to construct a $4,500,000 plant in Australia for the production of Geon vinyl plastic materials. The new facility will be built in cooperation with Australian interests and when added to existing Australian vinyl production, is expected to take care of all of the country's forecast needs for that product. Basic raw materials for the manufacture of Geon will come from Australian sources.

Djakarta—A tire factory ordered from Czechoslovakia in 1957 has been opened officially in Djakarta. The new facility is expected to produce 250,000 sets of tires for jeeps and trucks annually.

Warsaw—Poland has been trying to expand its output of synthetic rubber to 20,000 metric tons annually by 1960 and 50,000 by 1965. That country has signed contracts to sell $2 million worth of motor vehicle tires to Yugoslavia and smaller quantities to Finland and Turkey.

Rio de Janeiro—Firestone Tire and Rubber Co. and the Goodyear Tire and Rubber Co. have signed a contract with Petrobas Corp. of Brazil to build and initially operate a synthetic rubber plant with a capacity of 40,000 tons annually. The unit will be located beside the new Rio refinery at Duque de Caxias. Firestone and Goodyear will also finance the new plant, cede patents and provide trained personnel.

Paris—Compagnie Francaise du Carbon Black (Cofrablack), the French firm formed and financed by Continental Carbon Co. and Phillips Petroleum Co. has purchased a large estate at Bec D'Ambes in western France, where the company will build a mill to produce 25,000 tons of carbon black annually.

Bonn—Stauffer Chemical Co. and Kali-Chemie A. G. plan to form a joint company to produce and market a special insoluble sulfur in Western Europe. The company, to be known as Kali-Chemie-Stauffer G.m.b.H., plans to build a plant at Hanover, Germany. Expected to be in production by January, 1960, output of the new facility will be marketed under the Crystex tradename by Kali-Chemie.

Canberra—A new company has been formed to produce styrene monomer in Australia by Monsanto Chemical Co. and Petroleum Chemicals Corp. (Australia) Ltd., of Sydney. The company, Australian Petrochemicals Ltd., will start construction immediately of a multi-million dollar plant at Silverwater near Sydney. Manufacturing operations are scheduled to begin in 1961.

Air Pressure Alone Holds Up World's Largest Fabric Dome!

the problem: **To provide a large missile shelter of economical construction, easily transported and quickly erected.**

the solution: **The Pentadome, made of vinyl-coated nylon, easily transported, quickly erected by ten men in one day.**

Procured by the U. S. Army Quartermaster R & E Command for use by the Ordnance Corps, the Pentadome provides missiles and their crews with ideal protection from dust, rain and high winds. The main dome, 85 feet high, 150 feet in diameter, and four smaller connected domes 50 feet high, 100 feet in diameter, are wholly supported by internal air pressure supplied by blowers. Domes can withstand a gale of 70 miles an hour or more.

Birdair Structures, Inc. specified that the 18,000 square yards of nylon base fabric for vinyl coating be by Wellington Sears. Designed to retain flexibility at −40° F., it is the heaviest single-ply fabric ever used in an air-supported structure.

Wellington Sears, with over a century of experience, would welcome the opportunity to help you solve problems related to fabrics, in rubberizing, coating, laminating, or any combination of textiles with other materials. For a useful booklet, "Fabrics Plus," write Dept. G-8.

Preparing to put up Pentadome, made by Birdair Structures, Inc., Buffalo, New York. Wellington Sears nylon base fabric was vinyl-coated by Sawyer-Tower, Incorporated, Watertown, Mass.

WELLINGTON SEARS

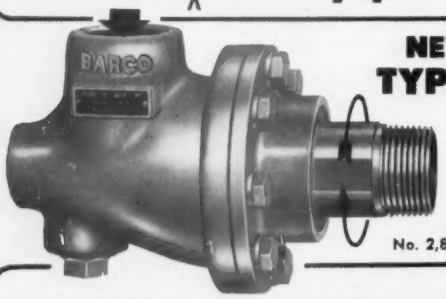
WEST POINT TEXTILES

FIRST In Fabrics For Industry

Rubber For Mechanical Goods, Coated Materials, Tires, Footwear and Other Rubber Products

Wellington Sears Company, 111 West 40th Street, New York 18, N.Y. • Atlanta • Boston • Chicago • Dallas • Detroit • Los Angeles • Philadelphia • San Francisco • St. Louis

Need a Better rotary joint?



NEW TYPE C

Patent No. 2,836,439

-it's BARCO!

For countless applications, Barco's new Type C Rotary Joint will give you the best operating records you've ever had—*and for LESS COST!*

"CRACK-FREE" CHROME PLATED SLEEVE—A standard Barco feature. Minimizes corrosion, friction, wear. Stainless steel spring also standard.

RESISTS SEAL RING BREAKAGE—The spherical seal ring is under compression, not *tension*, loading. Self-adjusting for wear. Seal withstands shock loads and alternating hot and cold service.

WIDE SPACED BEARINGS—Two, instead of one . . . increased bearing area. No lubrication required. Lowest friction.

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Hydraulic Presses Since 1901

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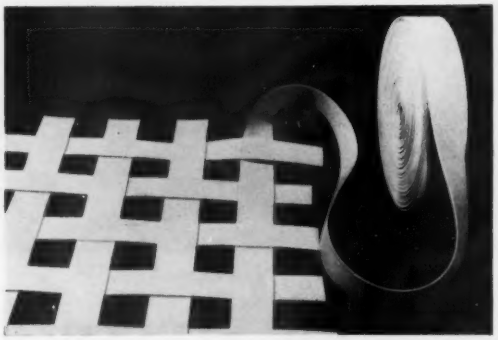
New Goods

American Latex Rubber Webbing

► American Latex Products Corp., Hawthorne, Calif., has introduced a new reinforced rubber webbing for the furniture industry. Fastened to furniture framework, the new webbing replaces spring units to support chair and sofa cushions and is said to give clean functional lines to modern furniture styles. According to the company,



the webbing is easily installed due to a uniform "tension" that is engineered into it. Core of the new webbing is a loose, square woven cotton fabric impregnated with a specially compounded rubber which provides superior strength and durability, the company states. Supplied in several standard widths, it is ⅛ inch thick and is packaged in 100 foot rolls.

U. S. Rubber T-V-Belt

► A combination timing belt and V-belt that is said to permit the transmission of power with both sides of the belt has been introduced by the U. S. Rubber Co., New York, N. Y. The company states that this is the first type of double-duty belting that enables users to take advantage of a positive drive, non-slip timing belt that requires no lubrication. In the dual power T-V-belt, a single serpentine drive powers all accessories on an automobile. According to U. S. Rubber, the timing belt can operate at speeds up to 16,000 feet per minute, running more quietly than precision gears set in an oil bath.

In addition, this type of belting can operate on fixed centers without take-up adjustments; it is compact; and speed ratios up to 30:1 are possible. Flexibility of the timing belt is said to permit pulley diameters as small as half an inch at 10,000 rpm, even with relatively heavy loads. T-V-belts are of integral construction and are currently manufactured in standard ⅜ and ½ inch pitches for light and heavy duty applications. Other standard timing belt pitches of 1/5, 7/8 and 1¼ inches, are expected to be added, and special pitches can also be fabricated to order.

Another new development using

B.F.Goodrich Chemical *raw materials*

Oil Resistant Ripple® Soles for Colt work shoes are molded of Hycar by Beebe Rubber Company, Nashua, N.H. B.F.Goodrich Chemical Company supplies the Hycar nitrile rubber.

Now Ripple® Soles go to work

HYCAR MAKES THE SHOES FIT THE JOB

The relaxing comfort and shock absorbing action of these unique shoe soles now fit the feet of workers in industrial plants, machine shops and gasoline stations. The soles are being made with Hycar nitrile rubber to provide resistance to the oils, alkalies and acids commonly found in such locations.

Standing up to oils, greases and solvents that would quickly do ordinary rubber to death is just one of the advantages of Hycar. It also withstands repeated and severe deformation, and retains outstanding resilience under a wide range of temperature variations.

In addition, Hycar earned this statement from the maker of the soles: "It is the best to work with of any of the nitrile rubbers tested."

Hycar is often the material that can step up sales—it improves present applications or opens the way to new markets. Get more information by writing Dept. CA-7, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

Hycar

Rubber and Latex

B.F.Goodrich Chemical Company
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B.F.Goodrich GEON polyvinyl materials • HYCAR rubber and latex • GOOD-RITE chemicals and plasticizers

News about

B.F.Goodrich Chemical *raw materials*

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This carboxyl-modified nitrile rubber gives a compound far more abrasion resistance than any other rubber. During laboratory testing, garnet paper actually wears out without making any headway against this Hycar rubber.

Hycar 1072 gives all the advantages of isocyanate rubber at considerably lower cost, besides providing easier processing. In addition, Hycar 1072 will provide high gum strength, good hot tensile and tear strength, and good oil resistance combined with resistance to ozone.

Hycar 1072 offers new opportunities for makers of caster wheels, skate wheels, hard rolls, loom parts, football shoe calks and shoe heels.

For further information about Hycar 1072, or information about any of the many other Hycar nitrile rubbers or latices, write Dept. CA-7, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

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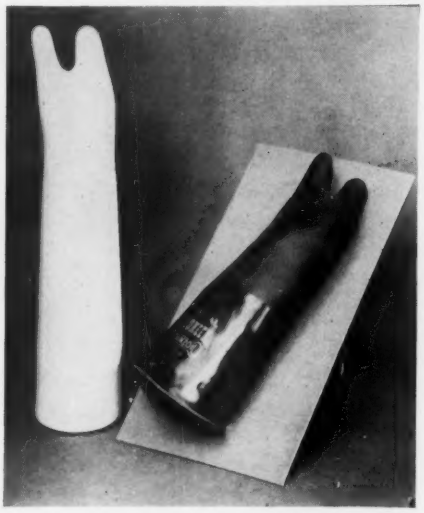
Custom-Made Industrial Gloves

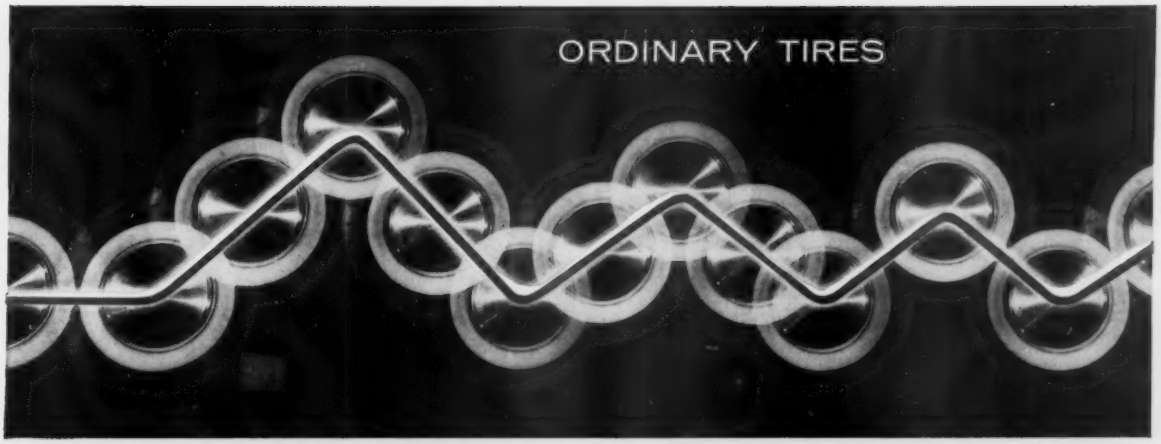
► As part of its complete hand protection program for industry, Pioneer Rubber Co., 296 Tiffin Road, Willard, Ohio, provides a custom order service through its Industrial Glove Division. Workers with unusual fitting problems can obtain specially-made gloves that provide freedom of

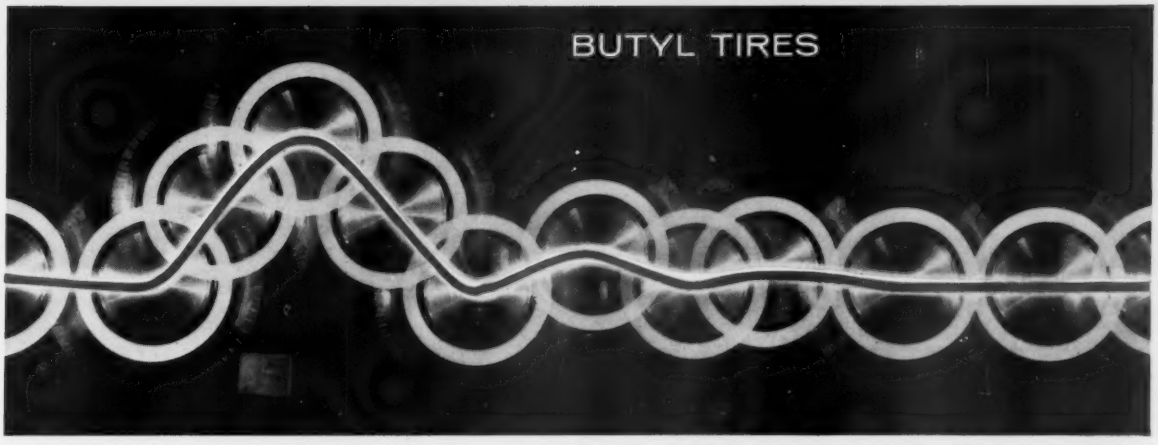


movement and maximum sensitivity despite the unique sizes or shapes of their hands, according to Pioneer. Special molds are made from outline drawings of workers' hands, or plaster of paris casts made by attending physicians, can also be utilized. The gloves are made on these molds which are then labeled with the name of the individual and kept on file. There is a nominal fee for the design and preparation of the special mold but the custom-made gloves are supplied at regular cost.

Goodrich Mark IV Space Suit

► B. F. Goodrich Aviation Products, a division of the B. F. Goodrich Co., Akron, Ohio, in cooperation with the U. S. Navy, has developed the Mark IV suit to protect man in space. The suit has been adopted by the Navy for operational use in aircraft above 45,000 feet and is at present being used by squadrons flying the F8U Crusader. The Mark IV looks like a conventional flying suit and has been described as flexible and light in weight (20 pounds). It is said to be capable of providing artificially pressurized environments so that even in a vacuum, a pilot would be as comfortable and operational as he is now at 35,000 feet. The suit also protects the wearer from exposure in the event of emergency ditching. Wind blast tests and sled tests have been performed at speeds up to Mach 1.2, and land survival tests have been conducted at temperatures of 30° below zero for more than seven hours without discomfort to the subject, the company states.





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In addition to 100 other Butyl parts, tomorrow's best-selling cars will have tires of Butyl. One short demonstration ride can prove that any car equipped with Butyl tires gives traction, safety, and silence never experienced before. Butyl tires are now available to the motoring public. Let us show you how Butyl can help make better rubber products.

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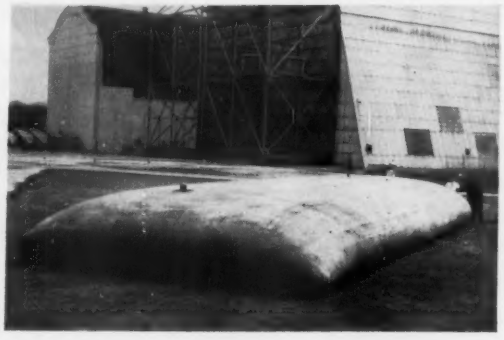
Goodyear Pillow Tank

► Aviation Products Division of the Goodyear Tire and Rubber Co., Akron, Ohio, has developed and manufactured a pillow tank having a rated capacity of 50,000 gallons, which is said to be the world's largest. To be used for storing bulk liquid, the new fabric tank is intended for both commercial and military appilcations. It is made of synthetic-coated nylon and is impervious to climate and the effects of contact with liquid petroleum products, the company states.



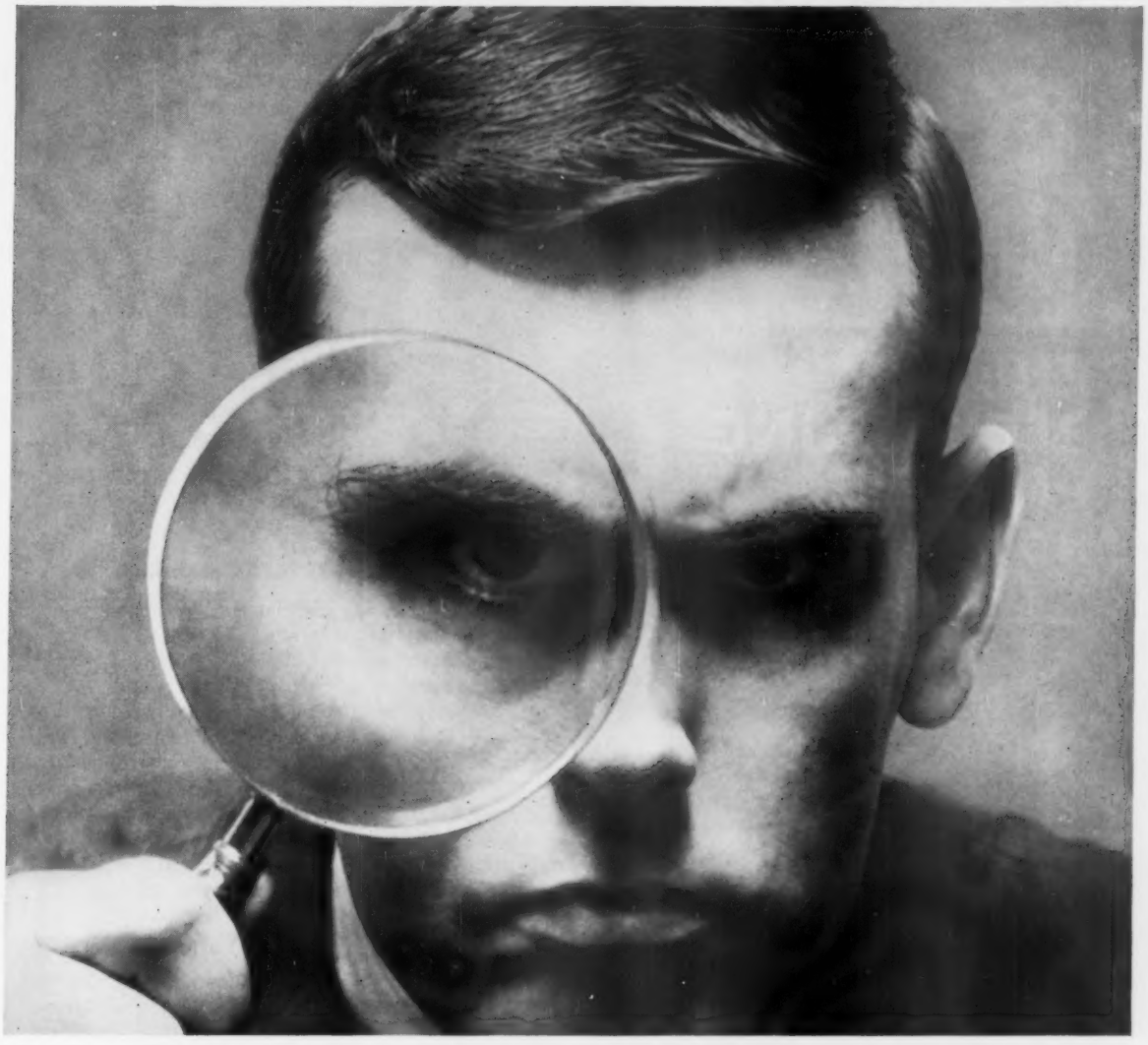
In use, the pillow tank can be unrolled on a flat site and can be readily emptied and rolled up into a relatively small package. In addition, it can be used and stored under a wide range of temperatures and conditions without deterioration.

Each tank is equipped with a vent-pipe and a filler-discharge fitting. The 50,000 gallon pillow, which measures 64 feet in length, 24 feet in width and weighs about one ton when collapsed, was manufactured at Goodyear's Rockmart, Ga., plant. The firm is equipped to manufacture tanks with rated capacities of 100,000 gallons and possibly more.

U. S. Rubber U-100 Sealing Tape

► U. S. Rubber Co., New York, N. Y., has developed a synthetic rubber tape, reinforced with nylon fibers, for use in curtain wall fabrications. In a typical curtain wall installation, use of the tape, designated U-100 Sealing tape, is said to have allowed ironworkers to install porcelain exterior panels in the structure in about a quarter of the time normally used. U-100 tape may also be used where flexible gasketing and sealing is required; as an anti-squeak buffer between metal panels; and as a weather-stripping and caulking agent. According to U. S. Rubber, this tape has resistance to oxid'zing and hardening, virtually permanent flexibility, and excellent adhesion to a variety of surfaces, including glass, aluminum and brass. The tape, which comes in black and grey, is available in a dozen widths from ¼ to 3 inches and six thicknesses ranging from 1/32 to 3/16 of an inch.

NEED A TROUBLE SHOOTER?



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Interruptions in production, lowered output, higher costs and unsatisfactory products may often result when elastomers stick to mills or molds during the manufacturing process. But these troubles can be largely overcome with "A-C" Polyethylene Lubricants, which give you all the advantages of a lubricant in your rubber compounding without the drawbacks. Their use permits higher loading than would otherwise be possible, results in substantial savings in labor costs and the virtual elimination of rejects. Here's why "A-C" Polyethylene Lubricants are your ideal economical trouble shooters:

Processing is made easier • Roll sticking problems disappear • Closer dimensional tolerances are obtained • Extruding and calendering rates are increased • Shrinkage is reduced • Mixing cycles are shortened • Mold flow release properties are improved

"A-C" Polyethylene Lubricants are available in a wide range of grades for specific uses. Write for technical advice on applying them to your products.

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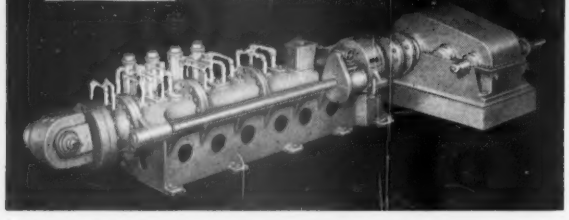
RUBBER RECLAIMING PROCESS
NOW AVAILABLE IN YOUR COUNTRY



the RECLAIMATOR process is now available on a licensing basis *all over the world.*

This is the only continuous and completely DRY process for reclaiming rubber. From beginning to end, devulcanization in the RECLAIMATOR takes only 3 minutes. Because of this short cycle time more of the desirable properties are left in the rubber. And . . . this process is AUTOMATIC and electrically controlled — no steam plant is required.

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Send for Reclaimator Book 20-A. Explains in great detail how RECLAIMATOR reclaims can benefit you in your industrial needs.

U.S.
RUBBER RECLAIMING CO., INC.
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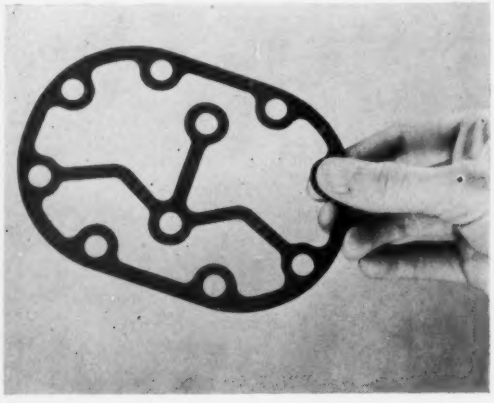
Taylor Gasketing Material

► Taylor Fibre Co., Norristown, Penna., has developed a composite gasketing material, called Avronite, which combines vulcanized fiber with Buna N. The composite material is so durable that in some instances it can replace metal-jacketed gasketing with cost savings to 25 per cent, the company states. It effectively seals internal



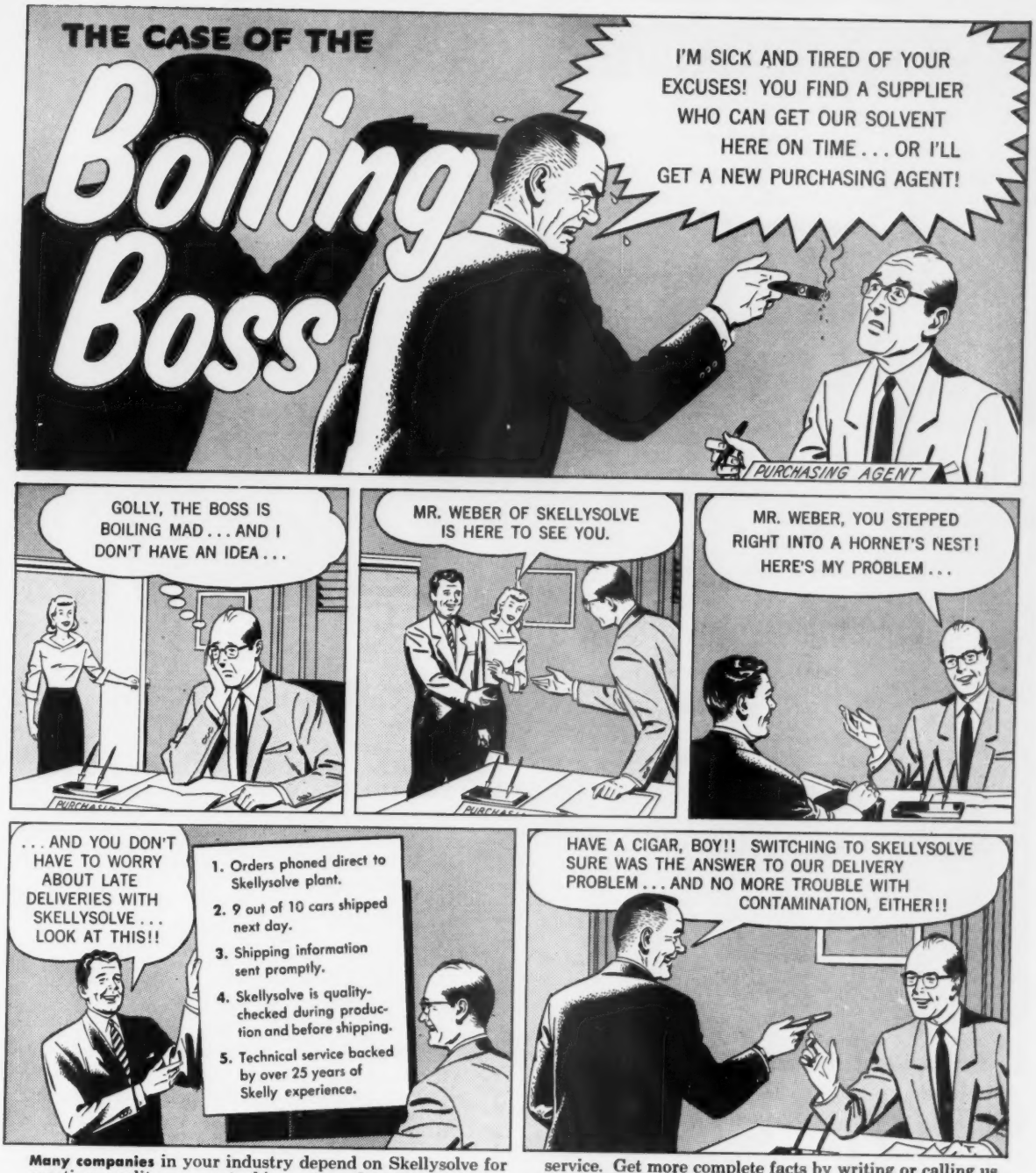
pressures running as high as 750 pounds per square inch at temperatures to 300°F. A low-temperature gasket material, Avronite is particularly valuable where oils, gasoline and similar fluids must be contained at relatively high pressures as in truck or heavy automotive applications. It is also useful where accurate spacing of gasket assemblies is vital and where relatively high flange pressures put a special squeeze on gasketing material. Avronite material cuts clean, without any residue of fuzzy edges to contaminate refrigerants or other fluids, Taylor states.

Vinylfoam Cushioning

► A molded vinylfoam cushioning, developed by Union Carbide Plastics Co., Division of Union Carbide Corp., is being used in various furniture groups in the 1959 line of the International Furniture Co. According to the company vinylfoam is fire-resistant, and its durability has been demonstrated by its use in a number of rigorous applications, ranging from theatre seating to jump seats in taxicabs. The material's resistance to oxidation and hardening keeps it resilient and "live" indefinitely and its non-discoloring properties assure that it will always remain attractive, the manufacturer states.

Rubber Stamp Prints Photographs

► Graphic Rubber Stamp Co., 11102 Magnolia, North Hollywood, Calif., manufactures a rubber stamp which reproduces photographs. The stamp, which is said to reproduce clear prints, is 1 x 1½ inches in size and comes with a stamp pad and plastic case.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I'M SICK AND TIRED OF YOUR EXCUSES! YOU FIND A SUPPLIER WHO CAN GET OUR SOLVENT HERE ON TIME . . . OR I'LL GET A NEW PURCHASING AGENT!
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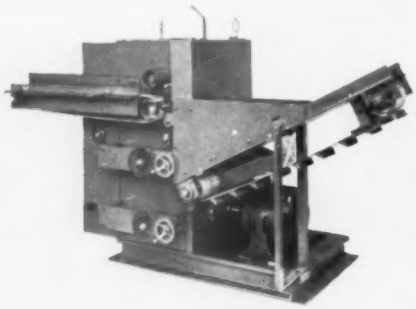
Where High Production is Required



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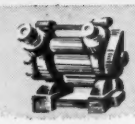


Penetration Hardness Tester

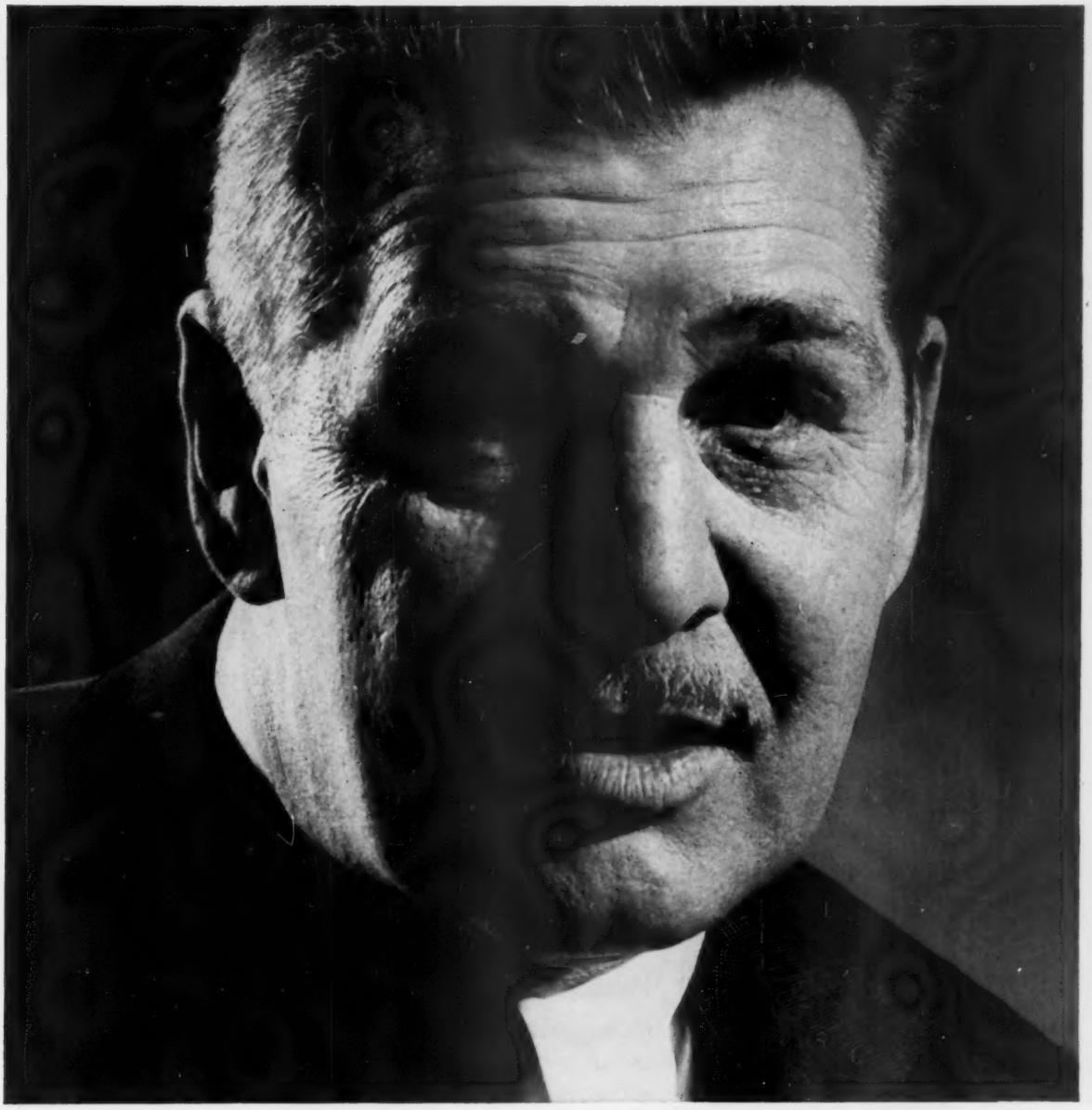
► A new instrument for the measurement of penetration hardness and resiliency of polymeric materials has been announced by Thwing-Albert Instrument Co., Penn St. and Pulaski Ave., Philadelphia 44, Penna. The instrument, called the

Continental Plastisol Cure Tester, is being produced by Thwing-Albert under an agreement with Continental Can Co. It consists of three components: a Vicat-type penetrating needle test unit; a regulated power supply for needle motion transducer; and a millivolt strip chart recorder for plotting penetration of the needle and elastic recovery of the material. The tester is said to measure accurately the cure of polymeric materials in thickness from 125 mils down to 0.7 mils. Minute differences in time and temperature are said to be easily detected. The tester is suitable for quality control work as well as research applications.

American Instrument Bench-Model Oven

► American Instrument Co., Silver Springs, Md., offers a new high-temperature bench-model oven said to give excellent constancy and uniformity values at temperatures ranging from 125 to 1000°F. For example, the company reports that a simultaneous temperature recording of eight thermocouples suspended two inches from the corners showed a uniformity of ±4°F. at 1000°F. The excellent temperature characteristics are the result of unique design. Electric resistance heaters are located in all six walls and are thermally weighted to produce maximum temperature uniformity.

Offering maximum work space (4 cubic feet) and occupying minimum bench space (34 x 33 inches), the oven features readily accessible, front panel-mounted temperature controls, pilot light, fuses and line switch. External straight line design permits oven stacking. Operating on 230 volt power, the oven will heat from room temperature to 1000°F. in 3½ hours.



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(Based on an actual conversation between a Du Pont Representative and a customer.)

▶ Talked to *your* Du Pont Pigments Representative lately? He'll be glad to point out the "extras" you get with Du Pont "Ti-Pure" titanium dioxide pigments. Call him today! E. I. du Pont de Nemours & Co. (Inc.), Pigments Department, Wilmington 98, Delaware. In Canada: Du Pont of Canada Limited, P.O. Box 660, Montreal, Quebec.

*Du Pont's trademark for its titanium dioxide pigments

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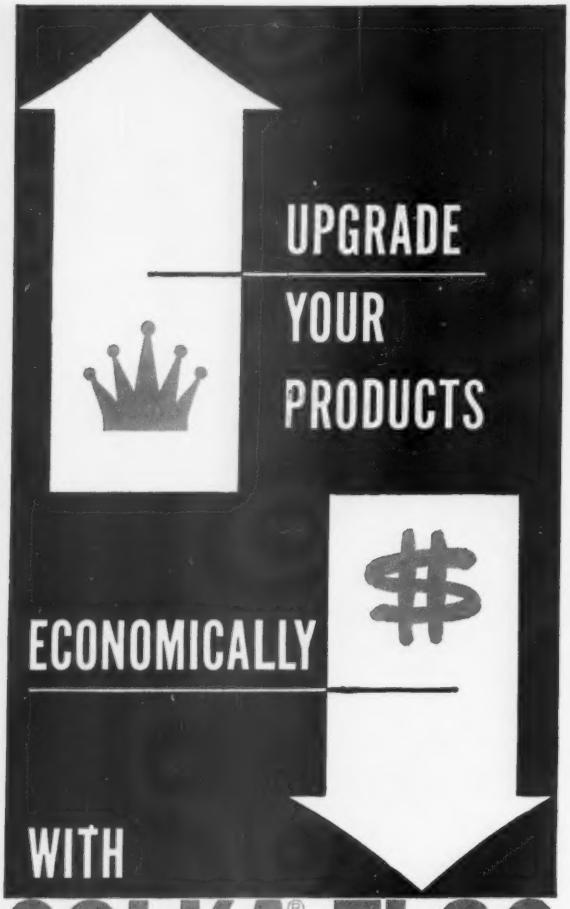

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- **Control dimensional stability**
- **Regulate hardness and flex life**
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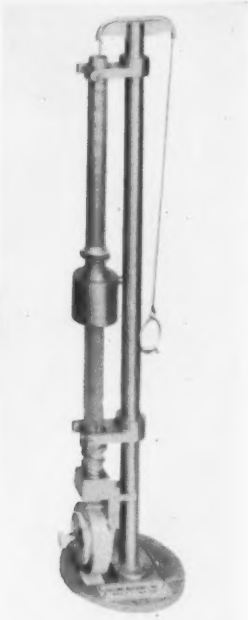
Brown Forests Products, Ltd., Montreal, Que. (ALPHA-FLOC)

Portable Tackmeter

► Testing Machines, Inc., 72 Jericho Turnpike, Mineola, Long Island, N. Y., has announced a portable instrument for assessing surface tack numerically. Tack is exhibited if, when surfaces



are pressed together, they tend to stick. The Dunlop tackmeter, as it is called, was developed at the Dunlop Research Center, and is typically used in measuring the tack of rubber-coated fabric to itself or to uncured rubber sheet, and for estimating the range of tack normally associated with such materials, but can be modified to suit less or more tacky surfaces. The instrument is hand-operated and easily portable. It assesses the tack of a surface from measurements which are normally carried out at ten chosen points on the surface. It does no damage to the surface under examination.

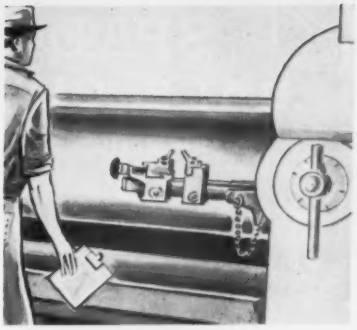
Hannifin Air Motor

► A new combination air power cylinder and electrically actuated control valve with built-in speed controls has been announced by Hannifin Co., Des Plaines, Ill. Called the Hannifin Air Motor, it combines all three basic components in a single air power package. Installation requires only one air line connection and simplified wiring to the solenoid-actuated, pilot-operated valve. The compact, square head cylinder has a rust-proof body, and an induction case hardened piston rod with hard chromium finish. Easily adjusted speed controls are built into the four-way valve port plate and provide accurate adjustment of cylinder piston speed in both directions.

Accurate, Cleaner-Cut Strips...

with new fold-away Goodman Mill Strip Cutter

Don't be satisfied with hit-or-miss dimensions, rough or beveled edges, on your stock stripping. The Goodman Rubber Mill Strip Cutter is specially designed for precision requirements of stock feeding to another mill, extruder or lay up machine. A built-in micrometer knob assures exact control over stock width. The toolsteel blades produce a clean, square-edged strip, and are easily sharpened. And, for *maximum safety*, the whole unit swings up, holding blades against the mill frame completely out of the operator's way. Models are available for mounting on right or left frames, for all 42"-48"-54" or 60" two roll mills. Write today for illustrated bulletin.



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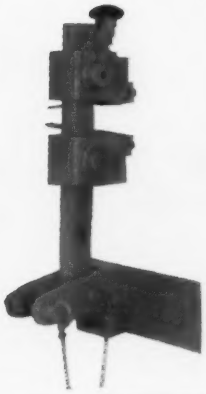
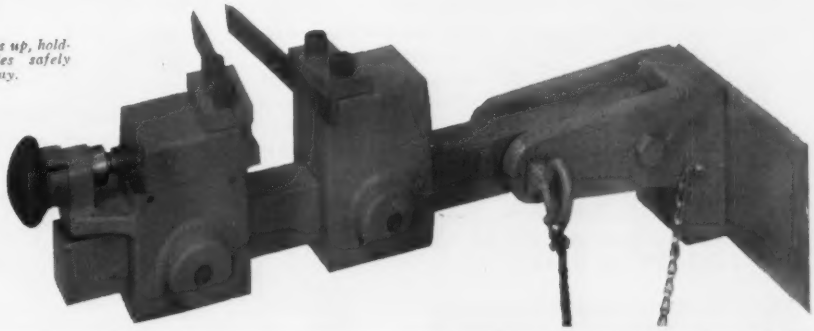


Unit folds up, holding blades safely out of way.



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Saves considerably on white pigments and color.

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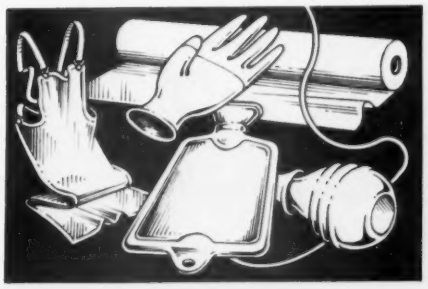
Feel free to submit your problems to us. Just explain your difficulty, or describe the effect you wish to achieve. Without obligation, our laboratory will gladly make helpful recommendations. Data on request any time.



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Automatically feeds, measures and cuts bales. Discharges cut pieces to take-away conveyor or tote box. Slice thickness adjustable from 2" to 6". Knife cuts on continuous time cycle or can be manually operated if desired. A fully self-contained unit. Knife 29" — stroke 23".

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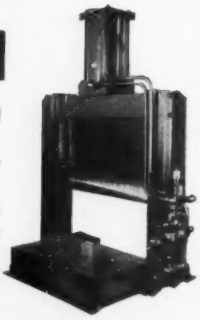

For laboratory use or compounding at Banbury.
Cuts full size synthetic Bales or Pre-cut Crude Rubber.
Air operated cushion action knife actuated by dual electric safety controls.
Easily mounted on Bench or Table — Knife 24" — stroke 12".

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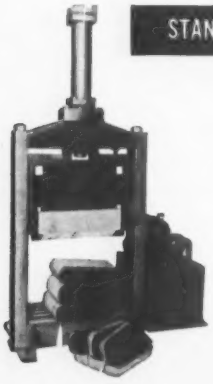

Cuts without lubricant.
Bales are advanced on rollers and can be cut into 1" minimum slices.
Cutters are manually operated and safety control valve requires operator to stand clear while knife is in motion.
Knife 29" — stroke 23" or knife 50" — stroke 36".

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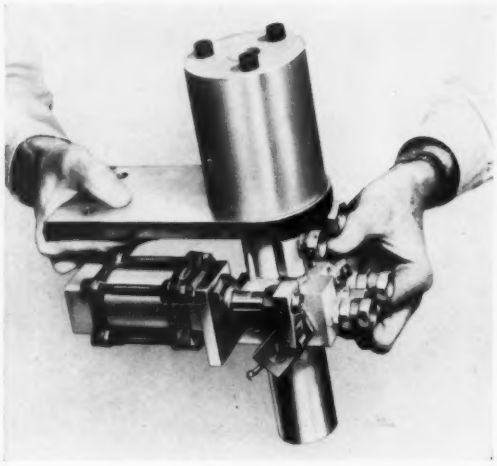
Mixing Head for Polyurethane Foams

► A mixing head for valving, mixing and dispensing polyurethane foams features a rod-type valve having teflon seals, which controls two or three material streams with sharp cut-off for on-off operation. The unit is designed for continuous recirculation of chemical components when mixing is not taking place. This principle allows for pressure balance of the mix and recirculate cycles,

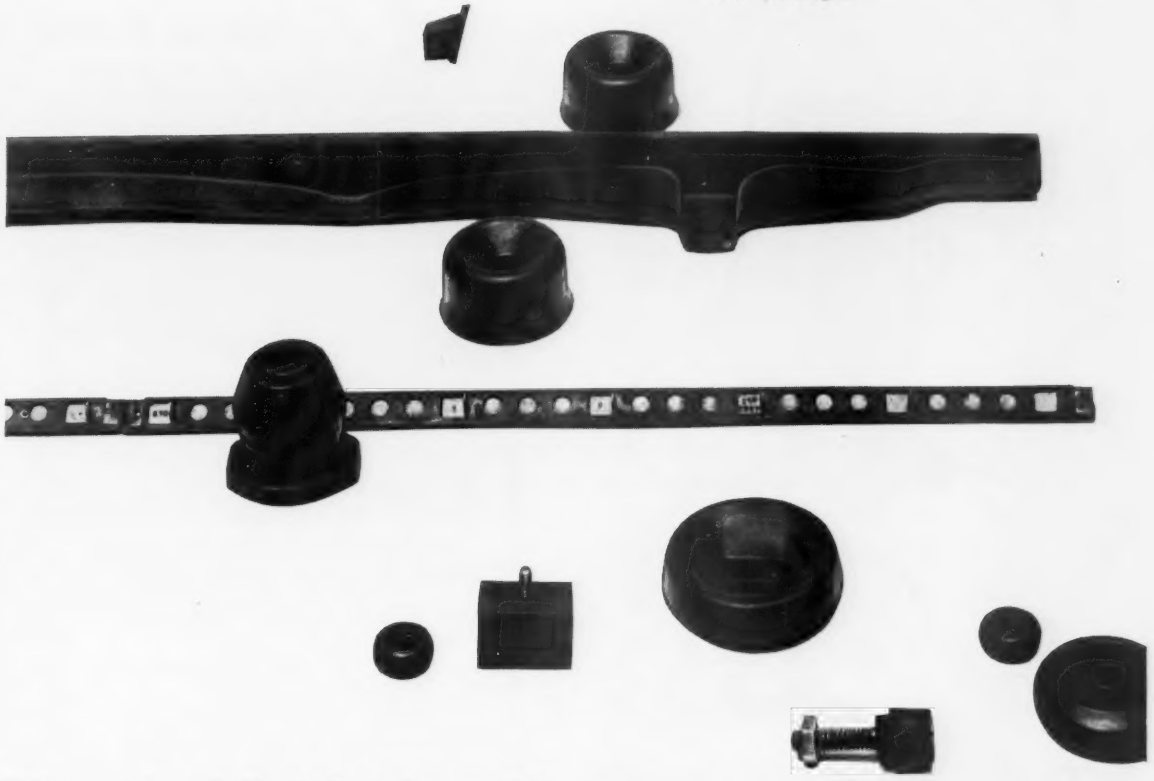


producing accurately proportioned components throughout the entire foaming cycle. Snap-action of the air cylinder-actuated valve is said to insure reproducibility of shots for the ultimate in accuracy of pours for filling cavities and molds. The mixing chamber is self-cleaning for production line molding applications, eliminating the need for flushing with solvent between shots. It is furnished, however, with an extra port which can be used for solvent flushing or air control in special applications. The unit is manufactured by Martin Sweets Co., 114 South First St., Louisville, Ky.

Nopco Ball Rebound Tester

► The Nopco Ball Rebound Tester, Model CS-111, has been added to the instruments offered by Custom Scientific Instruments, Inc., Kearny, N. J. The apparatus consists of an 18-inch vertical, clear plastic tube into which a ⅝-inch diameter steel ball (weight 16.3 grams) is released by an electromagnet. Circles on the tube aid in the visual recording of the rebound height. A single pole, single throw switch is used to connect the voltage source to the magnet. When the ball is dropped on a flexible foam specimen and the rebound measured, this rebound, as a per cent of the drop height, is the ball drop resilience.

Ameripol Rubber contributes to consistent quality of parts made by South Haven Rubber Company, South Haven, Michigan.



"Ameripol Rubber's uniformity keeps up the flow of high-quality low-cost parts"

These parts are typical of a variety of rubber products made by South Haven Rubber Company, principally for automotive use. In this high volume production, there's a premium on using rubber raw material of the highest uniformity—to keep costs in line and make high quality as predictable as tomorrow morning.

That's why Ameripol Rubber fits the bill for this manufacturer. By constantly testing both uncured and cured samples throughout production, Goodrich-Gulf makes sure of uniformity and consistent properties. Continuing research means continuing upgrading in rubber quality and ease of processing.

Reasons like these make Ameripol *the preferred rubber*. You'll prefer it in your production, too. For information call or write Goodrich-Gulf Chemicals, Inc., 3121 Euclid Avenue, Cleveland 15, Ohio.

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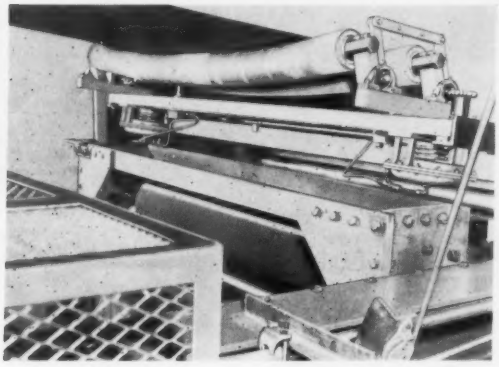
Mount Hope Web Master

► The Mount Hope Web Master, designed to eliminate production problems in tire-cord processing, is claimed by its manufacturer to avoid



wrinkling of fabric, loss of fabric width due to tension in the warp, uneven cord spacing and misalignment of either edge or of both edges of the fabric. Produced by Mount Hope Machinery Co., Taunton, Mass., the machine is said to be used with equal efficiency on cotton, rayon or nylon tire cord. Different models are adaptable to any stage or processing for operation at any production speed under web tensions up to 10,000 pounds across the roll. The control action of the machine may be applied to any type or weight open-weave textile, and is not limited only to tire cord.

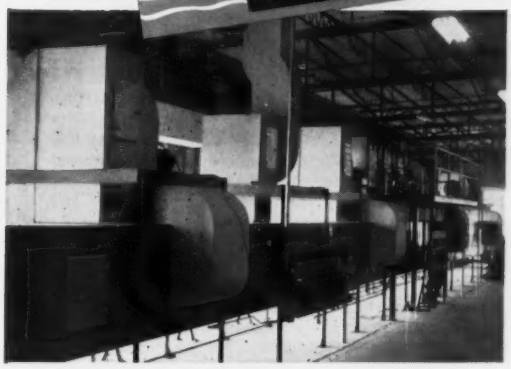
Beckman Analytical Ultracentrifuge

► The Spinco Model E ultracentrifuge, manufactured by Beckman Instruments, Inc., Stanford Industrial Park, Palo Alto, Calif., is available in a new model, designated E-HT, which is designed to permit the separation, identification and characterization of materials at temperatures as high as 120°C. or as low as 0°C. This makes the instrument capable of wider application in the polymer and other fields where solutes which are insoluble or insufficiently insoluble at normal temperatures can be studied. For use with materials having viscosities which change rapidly with temperature, ultracentrifuge runs can be made to proceed more quickly. Control of the rotor temperature is said to be better than within 0.1°C.

► Schutte and Koerting Co., Cornwells Heights, Bucks County, Penna., offer Mixing Eductors equipped with regulating spindles for the intimate mixing, blending or emulsification of two fluids. They can handle two liquids, a liquid and gas, or a liquid and slurry.

ROSS Air Systems

Engineered Atmospheres for Better Processing



- **FOAM RUBBER PROCESSING**
- **LATEX DIPPING AND DRYING**
- **TIRE CORD STRETCHING**

If the unit cost question is paramount, modernization may be the answer. If production needs to be stepped up, a new plant or section will bring both added capacity and lower unit costs. Either way, Ross Engineers have the specialized experience in the field of "Engineered Atmospheres" to do these special processing jobs RIGHT.

This term, "Engineered Atmospheres," is not merely a catchword. It is exactly what Ross Engineers create. We "engineer" or design the desired processing atmosphere together with the necessary enclosures. We integrate all the auxiliary and handling equipment. This processing atmosphere involves precisely heated air with controlled volumes and impingement velocities. Often, they have had to hold a 300°F or 350°F or 400°F temperature with only ±2° permissible variation for long periods. Yes, indeed, the processing of rubber and rubber products involves much more than passing quantities of heated air through an enclosure.

Yours is the decision... whether to modernize your processing steps to get lower unit costs... or to build anew with greater capacity to get both lower costs and greater production. Our job would be to engineer the air-system, design the equipment and manufacture the items to attain your objectives at economical costs. This has been our specialized work for close to forty years.

TO MODERNIZE OR—

TO BUILD ANEW

...that is the question!

M-R

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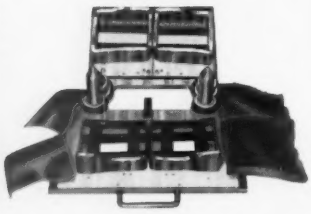

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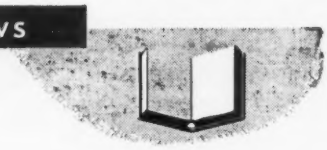
Reviews



Laminated Plastics. By D. J. Duffin. Published by Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y. 5 x 7½ in. 254 pp. $5.75.

A thorough survey of the manufacture, fabrication and applications of high- and low-pressure laminated plastics is offered in this volume. The various types and grades of raw materials and resins used and their physical characteristics are covered. Numerous tables present data on mechanical, chemical and electrical properties of the plastics as related to various kinds of industrial and consumer applications. A large number of photographs supplements the text.

In addition to the eight chapters which present the main body of material, the book has three appendices: the first on the history of vulcanized fiber and phenolic laminate manufacturing; the second a list of manufacturers of high-pressure laminates, and the third a list of U.S. trade names current in the laminated plastics industry. A glossary of basic terms and a subject index close the book.

As the requirements for high-pressure laminates have become more specialized, the trend has been toward the use of laminated plastics in combination with other materials, one of the most important being rubber. Applications include sealing materials where soft-sealing characteristics must be coupled with rigidity. Considerable technical data for this and other uses are provided.

Many in the rubber industry will find the extensive information on this class of materials which is presented in this book of great value. The demands of architecture and other applications indicate that many who work with rubber will be called upon to do so in connection with laminated plastics.

•

Report on Causes of Runn'ng Nip Accidents and Suggested Means for the Prevention of Such Accidents. Published by National Joint Industrial Council for the Rubber Manufacturing Industry, 236 Royal Exchange, Manchester 2, England. 5½ x 8¾ in. 80 pp.

This little book, published in England, is devoted to the problem of running nip accidents in the rubber industry. These accidents are particularly distressing, for in most cases the result is mutilation, amputation or multiple injuries. A running nip exists wherever sheet material passes onto a roller or bar. Running nips appear on a wide variety of machines used in processing rubber, the more common ones being calenders; liner feeding and stripping machines; and spreading, printing and doubling machines.

The book opens with a section devoted to a definition of the problem, and analysis of the kinds of actions in which people are involved when running nip accidents happen. Suggestions for guarding adequately against these accidents are presented.

The latter section of the book is given to detailed examinations of different kinds of running nip accidents. Eleven examples are included, each illustrated with photographs of the machines involved and schematic drawings of what happens, and showing the procedures involved in making the machines or operations safe.

The safety factor in plant operation surely need not be emphasized today—everyone is only too aware of what is involved in terms of personal tragedy and other less important considerations. And for that reason no further recommendation is needed for this excellent little volume.

FIRST, FINEST, FASTEST

Scovill, who developed and introduced the permanently-attached hose coupling, provides the finest service and fastest delivery in the industry today. It pays in three important ways to specify permanent or re-attachable couplings by Scovill. 1 FIRST—Scovill has more know-how on the correct applications, uses and maintenance of hose couplings. Scovill was the first to design and manufacture couplings for modern hose and is the leading supplier of fuel oil and gas pump couplings. 2 FINEST—Only Scovill gives you such fast, efficient service because only Scovill has a nation-wide network of sales offices and warehouse facilities. 3 FASTEST—Coupling orders received by Scovill are shipped immediately. Scovill makes and stocks a complete range of fuel oil and gas pump couplings. And the Scovill sales and service force—the largest and finest in the industry—is ready to consult with you anywhere and anytime. *For complete details, write: Scovill Manufacturing Company, Hose Coupling Department, Waterbury 20, Connecticut.*

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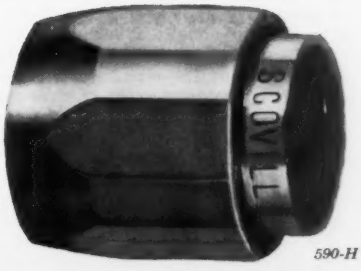
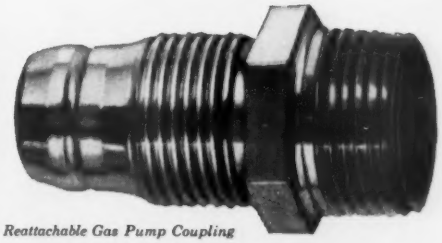
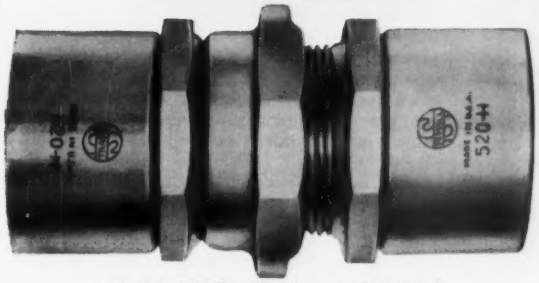




590-H Reattachable Gas Pump Coupling



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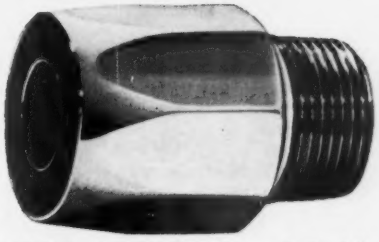

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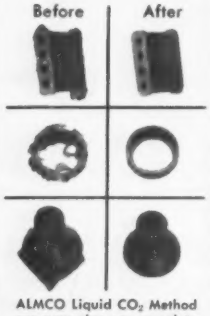

ALMCO Liquid CO_2 Method can now give you complete uniformity in a better quality finish on molded rubber parts of any size or shape. Saves time . . . saves money!

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Saves money. New ALMCO Liquid CO_2 Tumblers let you enjoy tremendous cost savings *of up to 75%* thru greatly increased production. Cost will approximate only $.015 to $.04 per lb. of rubber, depending on type of part finished.

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For full story on Liquid CO_2 Tumbling and on processing sample parts, write for ALMCO Album of New Products . . . *today!*

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REVIEWS (CONT'D)

Industrial Fatty Acids and Their Applications. Edited by E. Scott Pattison. Published by Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y. 6 x 9¼ in. 230 pp. $7.00.

This book covers the production and processing of fatty acids with emphasis on practical technology and chemistry. The coverage also includes an up-to-date review of the chemistry, technology and applications of derivatives having commercial importance. The growing industrial importance of fatty acids derived from tall oil is given special emphasis.

The book contains 16 chapters, each written by different authors recruited from industry. The topics of most interest to the rubber technician, as indicated by the chapter titles, are: Fatty Acids Today and Tomorrow; Production of Fatty Acids, Raw Materials; Production of Fatty Acids, Separation Processes; Fatty Acids from Tall Oil; Ozone and Other Cleavage Processes; General Chemical Reactions of Fatty Acids; Application of Fatty Acids in Rubber Technology; Fatty Acid-Derived Plasticizers and Copolymers; Polymers and Copolymers from Vinyl Esters of Fatty Acids; Handling Industrial Fatty Acids, and Test and Testing Methods.

The chapter on application of fatty acids in rubber technology is authored by J. E. Hocking and R. H. Jones of Darling & Co. After a short section on background material, the chapter continues with a discussion of natural rubber, describing vulcanization and compounding with special emphasis on the role of fatty acids. A similar section is presented on synthetic rubber, with a full explanation of the role of fatty acids in emulsion polymerization. A short closing section is devoted to miscellaneous rubber uses of fatty acids. A list of literature references follows the text.

The editor and authors are to be commended on a job well done. The technician working in any of the fifty or more industries which use fatty acids will find dependable information on these important materials.

•

Executive Selection: How Psychologists Can Help. Published by Management Reports, P. O. Box 136, Cambridge 38, Mass. 8½ x 11 in. 130 pp. $12.50.

This paperbound book, prepared by a group of graduate students at the Harvard Business School, can be considered a first handbook for management in the use of psychology as it applies to executive selection. The authors have conducted intensive interviews with psychologists currently dealing with management problems, and with managers who have employed psychologists, particularly for the purpose of choosing executives. The result is a detailed summary of the practice of psychological evaluation, with emphasis on what both management and the psychologist expect to accomplish and what the final results actually are.

The book follows the process from finding a psychologist, through introducing him to the company, right up to the conclusion reached by the psychologist, how he reports his findings to management and how an executive can weigh the results in the final selection. Of special interest is a chapter on the mechanics of reporting psychological findings to management, including a discussion of to whom the psychologist reports, how and when the report is made, and who in management sees the report. An interesting survey of a field which management would do well to investigate closely.

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BOOKLETS, CATALOGS, etc.

Honeywell 800: A Superior Scientific Computer. Datamatic Division, Minneapolis Honeywell Regulator Co., 151 Needham St., Newton Highlands, Mass. 8½ x 11 in. 12 pp.

Factors of application of a new all-transistorized electronic computer system to scientific problems are described in this booklet. It outlines speeds, capacities and over-all performance qualifications of the Honeywell 800 system and gives specific examples of how its design and logic and other features contribute to its use and economy in scientific computation. The booklet is divided into sections on an introduction; basic specifications; central processor; input-output; automatic programming; simultaneous computing and processing; automatically controlled parallel processing, and examples.

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Alkyl and Alkylene Amines. Union Carbide Chemicals Co., 30 East 42nd St., New York 17, N. Y. 8½ x 11 in. 52 pp.

This booklet, describing the properties and uses of alkyl and alkylene amines and containing comprehensive data on 19 of the materials, includes information on physical properties, end-use possibilities, physiological properties and storage and handling methods. A detailed bibliography and reference section is a part of the presentation. The alkyl amines are recommended as intermediates for rubber chemicals, and the alkylene amines find application in synthetic rubber. An attractive publication.

•

Development Engineering. Mast Development Co., Inc., 2212 East Twelfth St., Davenport, Iowa. 9 x 11¾ in. Unbound.

The services of a company which does product research and development are described in this brochure. It contains several unbound sections on different aspects of the endeavors of the organization. One of these is devoted to the research and development background in the ozone equipment field (the company also supplies a complete line of ozone test equipment). Also developed and distributed by the company is a rubber hardness gage, as well as other equipment of interest to the rubber manufacturer.

•

Sprout-Waldron Roller Mills. (Bulletin 153-A). Sprout, Waldron & Co., Inc., 130 Logan St., Muncy, Penna. 8½ x 11 in. 4 pp.

This illustrated technical bulletin describes one, two, three pair high and double roller mills, presenting information on the function and operation of roller mills and fully explaining construction and design details. A table of specifications gives length, width, height, roll speeds, horsepower range and chipping weights of the mills. A complete discussion of the meaning of one point roll control is included. Photographs are used to advantage in portraying the mills.

•

General Electric Adjustable-Speed Drive Equipment for Calenders. (Bulletin GEA-6910). General Electric Co., Schenectady, N. Y. 8½ x 11 in. 8 pp.

This attractive publication presents information on a complete line of modern, all electric, adjustable-speed drives, motors and controls for use on calenders which process rubber, plastics and similar materials. The various drives discussed in the booklet are illustrated with photographs, and schematic diagrams show how they are applied in installation. A large table gives detailed information on the drives and their special features.

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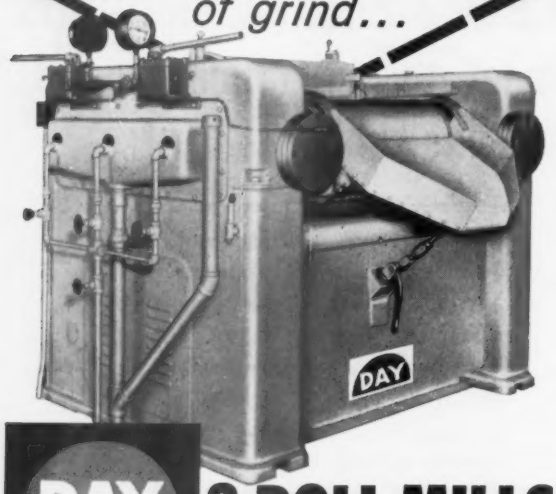

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Cane Wax Aids for Rubber Processing. Warwick Wax Division, Western Petrochemical Corp., 2 West 45th St., New York 36, N. Y. 11 x 8½ in. 8 pp.

This booklet gives a report of laboratory studies on three sugar cane wax products—wax crude, wax oxidized and resin—which show them to have desirable properties as rubber-processing aids. Discussed are effects on extrusion characteristics, uncured stock properties, milling characteristics and vulcanizate properties. The booklet contains four tables, three of which refer to styrene rubber, and give data on Garvey die extrusion, properties of the uncured polymer containing the wax processing aids, and characteristics of vulcanizates. The fourth table reports Mooney properties of uncured natural rubber compositions.

•

Hycar Polyacrylic Rubber. (Manual HM-3). B. F. Goodrich Chemical Co., 3135 Euclid Ave., Cleveland 15, Ohio. 8½ x 11 in. 32 pp.

Hycar 4021 polyacrylic rubber, one of a line of rubbers developed for high temperature service without degradation by sulfur or oxygen, is given a complete technical presentation in this bulletin. Discussed are general compounding, processing, compounding for specific applications and use in adhesives and coatings. Numerous recipes with detailed data on physical properties of the vulcanizates and suggested applications are given. Effects of additives are analyzed at length. The section on processing contains information on mill mixing, Banbury mixing, tempering and stock preparation. A comprehensive presentation.

•

Acetophenone. Union Carbide Chemicals Co., 30 East 42nd St., New York 17, N. Y. 8½ x 11 in. 12 pp.

Acetophenone (methyl phenyl ketone, acetylbenzene), widely used for its solvent and odorant properties and, because of the reactivity of its aryl, carbonyl and methyl groups, as an intermediate in the synthesis of a broad range of compounds, is analyzed in this technical bulletin. Physical properties, specifications, shipping data and graphs of solubility, vapor pressure and specific gravity are presented. The bulletin reports that benzaldehyde reacts with acetophenone to form benzal acetophenone which can be copolymerized with butadiene to obtain superior styrene rubbers.

•

Fatty Acids in Modern Industry. A. Gross & Co., 295 Madison Ave., New York 17, N. Y. 8½ x 11 in. 26 pp.

This catalog includes up-to-date specifications on the complete line of Groco stearic and oleic acids, tallow fatty acids and glycerides, coconut and other vegetable fatty acids, and glycerine. A chart shows the component fatty acids in these products. A list of the standard analytical test references used in the industry is also presented. A description of the properties of some 32 materials, many of which find application in rubber, is given.

•

Blue M Industrial Batch Ovens. Blue M Electric Co., Blue Island, Ill. 8½ x 11 in. 4 pp.

This brochure describes and illustrates convection industrial batch ovens, utility ovens, aging ovens, drawer ovens, dry type incubators, dry air sterilizers and environmental cabinets. All feature the Power-O-Matic control system designed to proportion minimum wattage in relation to temperature and work load. Specifications for all units are provided as well as a listing of optional accessories (timers, observation panels, stands, lead-in parts, overtemperature protection, etc.).

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MARKET REPORTS

TRENDS
NEWS
PRICES

Natural Rubber

Since our last report (July 1), the price of natural rubber on the New York Commodity Exchange has moved in a range of 338 points, high for the period being 37.13c reached on July 31, and low being 33.75c reached on July 2. The average price of spot rubber for the month of July was 35.19c based on 22 trading days. This compares with an average of 34.31c in the previous month.

Analysts at Merrill Lynch, Pierce, Fenner & Smith point out that the prime mover in the market these days seems to be in the continuation of Communist Bloc purchasing. The Soviet Union has taken over 25,000 tons for July and August shipment.

Last year, the Russians took a total of about 210,000 tons from all suppliers, and it looks as if this quantity may be exceeded this year. China has also returned to the market.

Stockpile Situation

The stockpile situation remains in the news. Singapore remains fearful that rubber will begin to move out of strategic stocks. While a legislative snag has held up passage of an amended stockpile bill, the feeling lingers in many trade quarters that something close to 40,000 long tons of rubber will be released through June 30, 1960.

Trade circles are of the opinion that the release of such a quantity would not depress the market. Even with this amount released, there would still be a deficit. This deficit is still expected to be in the nature of 75,000 long tons this year.

This may be one the largest peacetime deficit years on record, and many trade sources do not look for relief from tighter supplies until later in 1960. The course of prices over the near term may, however, receive greatest emphasis from day-to-day developments.

Setting Price Patterns

In balance, Russian and American buying set the price pattern for natural rubber. Both give indications of surpassing 1958, and natural rubber purchases in the second half of this year could easily outdo those in the first.

Were the stockpile not an issue at all, it might be easy to suggest that the 1959 world deficit of natural could far exceed the deficit of 1958 which was rather small.

Even assuming that small orderly releases are forthcoming from the stockpile, a fair deficit of natural still seems to be in the cards. Moreover, it will be seen that prices have not had much difficulty in moving up despite the slack season and expected stockpile sales.

NEW YORK, AUGUST 3, 1959

Price Data

Closing Rubber Prices on New York Commodity Exchange

FROM JULY 1 TO JULY 31

July	Spot	Sept.	Nov.	Jan.	Sales
1	34.00	33.85	33.65	33.45	91
2	33.75	33.65	33.45	33.40	41
3	....	....	....	....	...
4	....	....	....	....	...
5	....	....	....	....	...
6	34.38	34.35	34.10	33.95	89
7	34.13	34.01	33.95	33.75	61
8	34.38	34.30	34.10	33.90	49
9	34.38	34.20	34.00	34.00	21
10	34.13	33.90	33.70	33.60	58
11	....	....	....	....	...
12	....	....	....	....	...
13	34.38	34.02	33.90	33.60	17
14	34.75	34.79	34.45	34.25	87
15	34.88	34.50	34.10	33.90	85
16	35.13	34.80	34.45	34.10	41
17	35.13	34.75	34.35	34.05	32
18	....	....	....	....	...
19	....	....	....	....	...
20	35.25	34.95	34.70	34.20	62
21	35.63	34.35	34.85	34.45	101
22	36.00	35.70	35.15	34.65	78
23	36.13	35.90	35.25	34.68	56
24	35.38	35.05	34.75	34.20	115
25	....	....	....	....	...
26	....	....	....	....	...
27	35.88	35.60	35.15	34.55	67
28	36.75	36.30	35.60	35.00	116
29	36.25	35.90	35.18	34.65	64
30	36.38	36.25	35.50	34.90	55
31	37.13	37.00	35.90	35.35	149

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.37⅛
Sept.	.37
Oct.-Dec.	.36
Thin Latex Crepe:	
Spot	.84
Thin Brown Crepe, No. 2	.36⅝
Flat Bark Crepe	.31⅜

London Market
(Standard Smoked Sheets)

Oct.-Dec.	35.57 — 35.72
Jan.-Mar.	34.84 — 34.99

Singapore Market
(Standard Smoked Sheets)

Sept.	34.12 — 34.25

Middling Upland Quotations

	June 30	July 31		
	Close	High	Low	Close
Oct.	32.31	32.29	32.23	32.23
Dec.	32.34	32.26	32.23	32.23
Mar.	32.62	32.65	32.62	32.60

Notes & Quotes

Herbert D. Smith, general sales manager of the Tire Divison, U. S. Rubber Co., expects that American motorists will purchase 94.5 million passenger car tires this year, in addition to the 29 million tires that come on new cars. 1959 is expected to mark the eighth consecutive year of market growth with sales to be made up of 64.5 million replacement tires and 30 million retreads.

Synthetic Rubber

According to current reports, exports of synthetic rubber may amount to as much as 235,000 long tons this year, substantially above the 203,000 long tons exported in the peak year of 1957. The Rubber Manufacturers Association reports that shipments of synthetic rubber in the first half of 1959 totaled 135,128 long tons, compared with the 103,105 long tons exported in the first half of 1958.

The sharp increase was attributed mainly to a three-month strike at the Polymer Corp., Ltd., Sarnia, Ont., Canada. Polymer normally exports about 70 per cent of its 135,000 long ton annual production.

In a report appearing in the *New York Journal of Commerce*, Clayton F. Ruebensaal, director of commercial planning for the Texas-U. S. Chemical Co., observed that the increased demand for U. S. synthetic rubber was created by the cutback in Canadian production and does not denote stronger foreign demand.

U. S. Exports to Fall

Mr. Ruebensaal predicts that exports of synthetic rubber in the last half of this year will fall to about 100,000 long tons as Canada re-enters the market.

A spokesman for the Firestone Tire & Rubber Co. also predicted that the downtrend in synthetic shipments which started in 1958 will resume now that the Canadian strike has been settled.

Mr. Ruebensaal believes that U. S. exports of synthetic should drop 5 per cent a year for 1960 and 1961 and then 10 per cent a year for the following two years. By 1961, he said, United Kingdom capacity should be about 100,000 long tons; France about 75,000 long tons; Germany over 100,000 long tons, and Italy about 55,000 long tons.

U. S. Rubber Co. has also taken note of increasing foreign competition in synthetic rubber. L. C. Crockett, president of Goodrich-Gulf Chemicals, is another who sees the U. S. industry facing growing competition from European production.

Narrowing the Gap

M. W. Laibe, vice-president of the Goodyear Tire & Rubber Co., states that it is evident that the production capacity of synthetic rubber plants now in operation and those being built outside the United States will narrow the gap between supply and demand in that market. This, of course, will reduce the export requirements from the United States. Demand for U. S. synthetic after 1961 will probably continue at 100,000 to 150,000 long tons annually, industry circles agree.

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CYURAM*DS	*Pellets Powder*	Tetramethylthiuram Disulfide
CYZATE*B	*50% aqueous dispersion*	Zinc Dibutyl Dithiocarbamate
CYZATE*E	*50% aqueous dispersion*	Zinc Diethyl Dithiocarbamate
ZMBT	*Powder*	Zinc Salt of Mercaptobenzothiazole

*Trademark

CYANAMID **AMERICAN CYANAMID COMPANY** Rubber Chemicals Department Bound Brook, New Jersey

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Dry Rubber

(per pound carload)

Butadiene-Acrylonitrile Types

Butaprene NF	.4900
Butaprene NH	.6500
Butaprene NL	.5000
Butaprene NXM	.5800
Chemigum N1NS	.6400
Chemigum N3NS and N5	.5800
Chemigum N6	.5000
Chemigum N6B	.5000
Chemigum N7	.5000
Chemigum N8	.5000
Chemigum N600	.5000
Herecol N-33	.6800
Hycar 1001 and 1041	.5800
Hycar 1002	.5000
Hycar 1014	.6000
Hycar 1042 and 1043	.5000
Hycar 1051	.5800
Hycar 1052	.5000
Hycar 1053	.5000
Hycar 1072	.6400
Hycar 1203	.4600
Hycar 1312	.5000
Hycar 1411	.6200
Hycar 1432	.5900
Hycar 1441	.6200
Paracril AJ	.4850
Paracril ALT	.5000
Paracril B and BJ	.5000
Paracril BLT and BJLT	.5000
Paracril C and CLT	.5800
Paracril CV	.5900
Paracril D	.6500
Paracril 18-80	.6000
Paracril OZO	.4600
Polysar Krynac 800	.5000
Polysar Krynac 801	.5800
Polysar Krynac 802	.5000
Polysar Krynac 803	.5000
Tylac 640 and 2830	.5000
Tylac 740	.5400
Tylac 840, 2241 and 2570	.5800
Tylac 1640	.5900
Tylac 2430 and 2432	.5500

Butadiene-Styrene Types

Ameripol 1000	.2410
Ameripol 1001	.2410
Ameripol 1002	.2435
Ameripol 1006	.2410
Ameripol 1006 (crumb)	.2475
Ameripol 1007	.2410
Ameripol 1009	.2475
Ameripol 1009 (crumb)	.2590
Ameripol 1011	.2475
Ameripol 1012	.2425
Ameripol 1012 (crumb)	.2490
Ameripol 1013	.2410
Ameripol 1013 (crumb)	.2615
Ameripol 1500 and 1501	.2410
Ameripol 1502	.2410
Ameripol 1703	.2060
Ameripol 1705	.2035
Ameripol 1707	.1910
Ameripol 1708	.1910
Ameripol 1710	.1885
Ameripol 1712	.1885
Ameripol 1805	.1550
Ameripol 4600	.2410
Ameripol 4650	.1820
Ameripol 4651	.1770
Ameripol 4652	.1425
Ameripol 4654	.1870
Ameripol 4655	.1820
Ameripol 4700	.1750
Ameripol 4750	.1545
Ameripol 4751	.1400
Ameripol 4752	.1600
Ameripol 4753	.1480
ASRC 1000	.2410
ASRC 1001 and 1004	.2410
ASRC 1006	.2410
ASRC 1009	.2475
ASRC 1018	.2700
ASRC 1019	.2650
ASRC 1500	.2410
ASRC 1502	.2410
ASRC 1503	.2625
ASRC 1703	.2060
ASRC 1708	.1910
ASRC 1712	.1885
ASRC 1713	.1750
TSRC 3105 and 3106	.2410
ASRC 3110	.2600
Baytown 1600	.1930
Baytown 1601	.1930
Baytown 1602	.1930
Baytown 1801	.1760
Baytown 1803	.1740
C-102 (Shell)	.2300
Carbomix 3750	.1820
Carbomix 3751	.1545
Carbomix 3752	.1845
Carbomix 3753	.1640
Carbomix 3754	.1770
Carbomix 3755	.1470
CB-102 (Shell)	.1850
Copo 1500	.2410
Copo 1502	.2410
Copo 1505	.2610
Copo 1712	.1885
Copo 1773	.2060
Copo 1778	.1910
Copo 2109	.3000
Copo 3900	.2310
FR-S 123	.1960
FR-S 127	.2600
FR-S 141	.2800
FR-S 146	.2410
FR-S 154	.1885
FR-S 155	.1885
FR-S 158	.3000
FR-S 173	.2060
FR-S 178	.1910
FR-S 179	.2410
FR-S 181	.2410
FR-S 1000	.2410
FR-S 1001	.2410
FR-S 1004	.2410
FR-S 1006	.2410
FR-S 1007	.2410
FR-S 1009	.2475
FR-S 1010	.2600
FR-S 1012	.2425
FR-S 1013	.2500
FR-S 1014	.2810
FR-S 1500	.2410
FR-S 1502	.2410
FR-S 1703	.2060
FR-S 1710	.1885
FR-S 1712	.1885
Gentro 1500	.2410
Gentro 1712	.1885
Gentro-Jet 9152	.2080
Gentro-Jet 9153	.1820
Gentro-Jet 9154	.1845
Gentro-Jet 9250	.1580
Gentro-Jet 9251	.1640
Gentro-Jet 9252	.1670
Gentro-Jet 9275	.1500
Naugapol 1016	.2650
Naugapol 1018	.2700
Naugapol 1019	.2650
Naugapol 1021	.3000
Naugapol 1022	.2800
Naugapol 1023	.2850
Naugapol 1503	.2625
Naugapol 1504	.2950
OB-102 (Shell)	.1825
OB-104 (Shell)	.1475
OB-106 (Shell)	.1510
OB-110 (Shell)	.1410
OB-111 (Shell)	.1540
OB-113 (Shell)	.1750
Philprene 1000	.2410
Philprene 1001	.2410
Philprene 1006	.2410
Philprene 1009	.2475
Philprene 1018	.2700
Philprene 1019	.2650
Philprene 1500	.2410
Philprene 1502	.2410
Philprene 1503	.2625
Philprene 1601	.1930
Philprene 1603	.1940
Philprene 1605	.1900
Philprene 1703	.2060
Philprene 1708	.1910
Philprene 1712	.1885
Philprene 1803	.1740
Philprene 1805	.1550
Plioflex 1006	.2410
Plioflex 1500C	.2410
Plioflex 1502	.2410
Plioflex 1507	.2410
Plioflex 1703	.2060
Plioflex 1710C	.1885
Plioflex 1712C	.1885
Plioflex 1713	.1750
Plioflex 1714C	.1725
Plioflex 1773	.2060
Plioflex 1778	.1910
Polysar Kryflex 200	.2510
Polysar Krylene	.2410
Polysar Krylene NS	.2410
Polysar Krynol 651	.1885
Polysar Krynol 652	.1910
Polysar S	.2410
Polysar S-50	.2410
Polysar S-X 371	.2550
Polysar SS-250	.2875
S-1000	.2300
S-1002	.2325
S-1006	.2300
S-1009	.2400
S-1011	.2325
S-1013	.2300
S-1100	.1850
S-1500	.2300
S-1502	.2300
S-1600	.1825
S-1602	.1825
S-1605	.1800
S-1703	.1950
S-1707	.1800
S-1709	.1775
S-1712	.1775
S-1803	.1650
S-1804	.1750
S-7701	.1850
SP-103 (Shell)	.2900
Synpol 1000	.2410
Synpol 1001	.2410
Synpol 1002	.2435
Synpol 1006	.2410
Synpol 1007	.2410
Synpol 1009	.2475
Synpol 1012	.2425
Synpol 1061	.2410
Synpol 1500	.2410
Synpol 1502	.2410
Synpol 1551	.2410
Synpol 1703	.2060
Synpol 1707	.1910
Synpol 1708	.1910
Synpol 1711	.1900
Synpol 1712	.1885
Synpol 8000	.2410
Synpol 8150	.1930
Synpol 8200	.1910
Synpol 8201	.1750
Synpol 8250	.1740
Synpol 8253	.1584
Synpol 8254	.1545
Synpol X 274	.2550

Butyl Rubbers

Enjay Butyl 035 and 150	.2300
Enjay Butyl 165 NS	.2400
Enjay Butyl 215	.2300
Enjay Butyl 217	.2300
Enjay Butyl 218	.2300
Enjay Butyl 268 NS	.2400
Enjay Butyl 325	.2300
Enjay Butyl 365 NS	.2400
Polysar Butyl 100	.2450
Polysar Butyl 101	.2775
Polysar Butyl 200 and 300	.2450
Polysar Butyl 301	.2550
Polysar Butyl 400	.2450

Chlorosulfonated Polyethylene

Hypalon 20	.7000
Hypalon 30	.7000

Fluoroelastomers

Kel-F Fluorel	$15.00
Kel-F 3700	$16.00
Kel-F 5500	$16.00
Viton A	$15.00
Viton A-HV	$15.00

Neoprene

	(prices l.c.l.)
Neoprene Types AC and CG	.5500
Neoprene Type AD	.5500
Neoprene Type FB	.6500
Neoprene Type GN	.4100
Neoprene Type GN-A	.4100
Neoprene Type GRT	.4200
Neoprene Type KNR	.7500
Neoprene Type S	.4200
Neoprene Type W	.3900
Neoprene Type WB	.4100
Neoprene Type WHV	.3900
Neoprene Type WRT	.4500
Neoprene Type WX	.4100

Polysulfide Rubbers

	(prices l.c.l.)
Thiokol Type A	.5000
Thiokol Type FA	.6900
Thiokol Type ST	1.2500

POLYMERS

Latex

(per pound carload)

Silicone Rubbers*

	(prices f.o.b.)
GE (compounded)	2.50 [3]
GE Silicone Gum (not compounded)	4.00 [3]
Silastic (compounded)	1.90 [3]
Silastic (gums)	3.85 [3]
Union Carbide (gums)	4.00 [3]
Union Carbide (compounds)	2.50 [3]

Butadiene-Styrene Types

Butaprene N-300	.4600 [3]
Butaprene N-400 and N-401	.5400 [3]
Chemigum 200	4900 [3]
Chemigum 235 and 236	.5400 [3]
Chemigum 245	.4600 [3]
Chemigum 246	.4600 [3]
Chemigum 247	.4600 [3]
Chemigum 248	.4600 [3]
CL-101 (Shell)	.2800 [3]
Hycar 1512	.4600 [3]
Hycar 1551	.5400 [3]
Hycar 1552	.4600 [3]
Hycar 1561	.5400 [3]
Hycar 1562	.4600 [3]
Hycar 1571	.5400 [3]
Hycar 1572	.5100 [3]
Hycar 1577	.4600 [3]
Hycar 1852	.4600 [3]
Nitrex 2612	.5000 [1]
Nitrex 2614	.4600 [1]
Nitrex 2614-A	.4600 [1]
Nitrex 2615	.5100 [1]
Nitrex 2615-A	.5100 [1]
Nitrex 2616	.5800 [1]
Nitrex 2617	.4600 [1]
Nitrex 2617-A	.4600 [1]
Nitrex 2619	.5700 [1]
Nitrex 2620	.5000 [1]
Nitrex 2625	.5000 [1]
Nitrex 2625-A	.5000 [1]
Nitrex J-6849	.5400 [1]
Copo 2101	.3000 [3]
Copo 2102	.3200 [3]
Copo 2105	.3200 [3]
Copo 2108	.3375 [3]
Copo 2110	.3200 [3]
Copo X-800	.2775 [3]
FR-S 2000	.2775 [3]
FR-S 2001	.2775 [3]
FR-S 2002	.3000 [3]
FR-S 2003	.3050 [3]
FR-S 2004	.3050 [3]
FR-S 2006	.2900 [3]
FR-S 2105	.3200 [3]
Naugatex 2000	.3375 [1]
Naugatex 2001	.3375 [1]
Naugatex 2002	.3500 [1]
Naugatex 2006	.3900 [1]
Naugatex 2105	.3600 [1]
Naugatex 2107	.3600 [1]
Naugatex 2108	.3600 [1]
Naugatex 2113	.3400 [1]
Pliolite 2000	.2775 [3]
Pliolite 2001	.2775 [3]
Pliolite 2076	.2900 [3]
Pliolite 2104	.3200 [3]
Pliolite 2105	.3200 [3]
Pliolite 2107	.3200 [3]
Pliolite 2108	.3000 [3]
S-2000 and S-2006	.2600 [2]
S-2101	.2600 [2]
S-2105	.2800 [2]
S-2108	.2900 [2]

Neoprene

Neoprene Latex 60	.4000 [3]
Neoprene Latex 571	.3700 [3]
Neoprene Latex 572	.3900 [3]
Neoprene Latex 601-A	.4000 [3]
Neoprene Latex 673	.5000 [3]
Neoprene Latex 735	.3800 [2]
Neoprene Latex 736	.3800 [2]
Neoprene Latex 842-A	.3700 [3]
Neoprene Latex 950	.4700 [3]

Polysulfide Rubbers

Thiokol Type MX	.8000 [3]
Thiokol Type WD-2	1.2500 [3]
Thiokol Type WD-6	.8000 [3]

Notes: (1) Freight allowed. (2) Freight extra. (3) Freight prepaid. *Covers a wide range of compounds. Readers are urged to check specific prices with producers.

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Greater Processing Safety for neoprene and rubber compounders can be virtually assured with Michigan Chemical's new 1782 Magnesia. Ten years of concentrated development and testing have produced a product of exceptional purity, whiteness, and particle size with many times the surface area of normal magnesias. This latter property and a high degree of chemical reactivity make Michigan 1782 Magnesia an excellent acid acceptor and curing agent. Vulcanizates exhibit good cure, tensile strength, modulus, elongation, and hardness. Repeated functional tests indicate that Michigan 1782 Magnesia compares with the finest anti-scorch agents currently in use.

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M-59-3

MARKETS

(continued)

Reclaimed Rubber

The Rubber Manufacturers Association reports that 148,362 long tons of reclaimed rubber were produced in the United States in the first six months of the current year. This compares with the 122,709 long tons produced in the previous year.

A total of 145,733 long tons of reclaim were consumed in the United States in the first half of 1959, contrasted with the 119,850 produced in the first half of 1958.

As of June 30, 1959, there were 23,800 long tons of reclaimed rubber in stocks on hand. On June 30, 1958, there were 27,763 long tons of reclaim on hand.

It now seems as if some 300,000 long tons of reclaim will be produced this year and that about 290,000 long tons consumed, making this one of the better years for the industry.

(Prices for All Areas Except Calif.)

	per lb.
Premium Grade Whole Tire	.11⅝
First Line Whole Tire	.11
Second Line Whole Tire	.10½
Third Line Whole Tire	.10¼
Fourth Line Whole Tire	.09¾
Black Carcass	.15¼
No. 1 Light Colored Carcass	.22
No. 1 Peel	.11
Butyl Tube Reclaim	.14
Natural Rubber Black Tube	.16
Natural Rubber Red Tube	.21
Natural Rubber Gray Tube	.21

Scrap Rubber

Fairly good activity has been maintained in the scrap rubber market during the past few weeks although some reclaimers are preparing to shut down for the annual vacation period. Scrap has been moving in fairly good volume to consumers in Akron, Buffalo and Naugatuck.

The Rubber Manufacturers Association reports that in the first six months of the current year a total of 134,072 long tons of scrap rubber were consumed in the United States. If consumption maintains its present pace, something like 270,000 long tons of scrap will be consumed this year.

As of June 30, 1959, there were 58,205 long tons of scrap rubber in stocks on hand. This sum is equal to about two months consumption.

(Prices Delivered Akron)

Mixed tires	ton	14.00
Light colored carcass	lb.	.04¾
No. 1 peelings	ton	32.00
No. 2 peelings	ton	28.00
No. 3 peelings	ton	23.00
Buffings	ton	16.00
Truck and Bus S.A.G.	ton	22.00
Passenger S.A.G.	ton	20.00
Natural Rubber Red Tubes	lb.	.07¼
Natural Rubber Black Tubes	lb.	.06½
Butyl Rubber Tubes	lb.	.05¼

Tire Fabrics

From here and there about the country comes news with bearing upon tire fabrics, and the industrial fabrics market. Industrial Rayon Corp., for example, has announced that by 1960 it will have its Cleveland, Ohio, plant converted from the production of rayon to Tyrex.

Chemstrand, meanwhile, has announced its intention to build a multi-million dollar nylon filament yarn plant near Greenwood, S. C. In the first phase of the plant's construction, the capacity to produce 10 million pounds of nylon will be installed. Production is scheduled to begin late next year.

Tennessee Eastman Co. has announced that it has started construction of an addition to its "Kodel" polyester fiber plant at Kingsport, Tenn. The new unit will raise the company's productive capacity of this type of fiber to 20 million pounds annually.

American Enka has appropriated $9.3 million for an expansion of its nylon plant at Enka, N. C. Construction is proceeding on schedule, and the new facilities are expected to be in operation early next year.

AviSun Corp., an equally-owned affiliate of American Viscose and the Sun Oil Co., will open a new polypropylene film plant and a fiber plant near New Castle, Del., while DuPont has announced that it will build a multi-million dollar unit at its Memphis plant to produce acrylonitrile. Much of the acrylonitrile produced will go into the company's Orlon acrylic fiber.

A new plant is now being constructed in Holland for the production of non-woven textiles. Von Kohorn International Corp. has entered into a contract with the Soviet government for the construction of a rayon staple plant.

All of the foregoing is on indication of the world-wide activity now going on in fibers and textiles. New plants, new developments, new products are being announced every day, and it seems apparent that this will be a fruitful year for the industry.

(Prices f.o.b. Shipping Point)

Rayon Tire Cord

1100	lb.	.67½
1650	lb.	.67
2200	lb.	.67½

Nylon Tire Cord

210	lb.	1.96
840	lb.	1.61

Rayon Graded Fabric

1100	lb.	.69
1650	lb.	.63½
2200	lb.	.63

Cotton Chafers

8.9 oz. (per square yard)	lb.	.71
9.25 oz. (per square yard)	lb.	.69
11.65 oz. (per square yard)	lb.	.63
14.4 oz. (per square yard)	lb.	.72

Liquid Latex

Natural: According to the Rubber Manufacturers Association, a total of 39,498 long tons of natural rubber latex were imported into the United States in the first six months of the current year. In the first six months of the preceding year, a total of 35,241 long tons of natural rubber latex were imported.

In the first half of this year, 37,917 long tons of natural latex were consumed in the United States against the 32,132 long tons consumed in the first half of the preceding year.

As of June 30, 1959, there were 11,160 long tons of natural latex in stocks on hand, while on June 30, 1958, there were 17,078 long tons on hand.

Natural rubber latex is now selling at a 43 to 44c per pound level at East Coast ports. Once again, prices are at a level which may encounter some consumer opposition.

Synthetic: According to the latest available figures, consumption of all types of synthetic rubber latex is running at about 8,860 long tons a month. If this consumption pace continues for the rest of the year, something like 106,000 long tons of synthetic rubber latex will be consumed in 1959.

This is of interest because in 1958, 80,387 long tons of synthetic latex of all types were consumed. A jump to 106,000 long tons will be a considerable gain. Natural rubber latex will gain, but not by nearly as much, from 70,183 long tons in 1958 to an estimated 75,000 long tons in 1959.

Cotton

The price of middling uplands on the New York Cotton Exchange has moved in a range of 195 points since our last report (July 1), high for the period being 35.60c reached on July 1 and on three other days during the period, and low being 33.65c reached on July 31. The average price of middling uplands for the month of July was 34.67c based on 22 trading days. This compares with an average of 36.05c in the previous month.

According to a recent White House report, 614,900 bales of cotton with a value of $84,200,000 were exported from the United States in the first half of the current year. The estimated cost of this cotton to the Commodity Credit Corporation was $123,000,000, the report stated.

Since the inception of the program in July, 1954, 3,978,000 bales were exported with a market value of $616,000,000 and a CCC cost of $824,500,000. This included 25,000 bales of extra long staple cotton. Some $2,500,000 worth of cotton has also been supplied to voluntary agencies for the manufacture of mattresses for the needy in Germany, Spain and Viet Nam.

The severe, ill-fitting "envelope" bathing cap of former days is outmoded. Imaginative styling has taken over, to create a crown of beauty out of new polymers.

Beauty–in and out of the swim

To achieve the cooling whites and becoming pastels the designer wants, compounders choose TITANOX® white titanium dioxide pigments. TITANOX-RA in particular has really put white and tinted stocks in the swim.

There's rutile or anatase titanium dioxide white pigment in the TITANOX line for any rubber or plastic composition. Our Technical Service Department will be happy to help you select the proper one. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; offices and warehouses in principal cities. In Canada: Canadian Titanium Pigments Limited, Montreal.

TITANIUM PIGMENT CORPORATION
SUBSIDIARY OF NATIONAL LEAD COMPANY

7129

MARKET PRICES

AUGUST 3, 1959

Prices are, in general, f.o.b. works and cover the domestic markets only. Export prices, as a rule, are usually slightly higher, due to packing regulations, special handling, etc.

Abbreviations: bbls., barrels; c.l., carload; cyl., cylinder; dlvd., delivered; dms., drums; eqld., equalized; l.c.l., less than carload; M.B. masterbatch; min., minimum; ref., refined; sap., saponified; sp., special; syn., synthetic; t.c., tank cars.

***Trademark. †For Export Only.**

The arrangement of this section closely follows the Chemical Section of the 1957-58 RUBBER RED BOOK. Readers are referred to that edition for the correct classification of any material or brand name. Suppliers of every material are contacted for price information. However, only those materials are listed for which quotations have been furnished within the past six months. The quotations are not guaranteed and prospective purchasers should contact suppliers for information. Suppliers are requested to send current price information to the Market Editor, RUBBER AGE.

ACCELERATORS

A-1 (Thiocarbanilide)*	lb.	.74	.81
A-32*	lb.	.66	.80
A-100*	lb.	.52	.66
Accelerator No. 8*	lb.	—	1.25
Accelerator—49*	lb.	.59	.60
Accelerator 89*	lb.	—	1.20
Accelerator 108*	lb.	.92	.97
Accelerator—552*	lb.	—	2.25
Accelerator—808*	lb.	.66	.68
Accelerator—833*	lb.	1.17	1.19
Accelerator B*	lb.	—	.89
Altax*	lb.	.54	.56
Amax*	lb.	.80	.82
No. 1*	lb.	.76	.78
Ancap*(†)	lb.	.38	.40
Ancatax*(†)	lb.	.48	.50
Ancazate BU (ET & ME)*(†)	lb.	—	1.07
Ancazide ET*(†)	lb.	—	1.07
ME*(†)	lb.	—	1.14
Arazate*	lb.	—	2.25
Arquad 12*	lb.	.55	.61
Beutene*	lb.	.66	.71
Bismate, Rodform*	lb.	—	3.00
Butazate*	lb.	.87	.92
Butyl Eight*	lb.	1.10	1.35
Butyl Namate	lb.	.45	.5[illegible]
Captax*	lb.	.44	.46
C-P-B*	lb.	1.95	2.00
Cumate, Rodform*	lb.	—	1.45
Cydac*		.76	.78
DIBS*		—	.85
Diorthotolyguanidine	lb.	.69	.70
Dipac*	lb.	—	.85
Diphenylguanidine	lb.	.49	.50
Dithiocarbamates Cyzate B & E	lb.	.85	.89
El-Sixty*	lb.	.62	.69
Ethazate*	lb.	—	1.04
50D*	lb.	.87	.92
Ethyl Thurad*	lb.	—	1.04
Ethyl Tuex*	lb.	—	1.04
Ethylac*	lb.	.93	.95
Guantal*	lb.	.62	.69
Harvex*	lb.	.70	.76
Hepteen Base*	lb.	1.85	1.90
Kure-Blend MT*	lb.	—	.70
Ledate, Rodform*	lb.	—	1.04
MBT-XXX*	lb.	.55	.57
MBTS Pellets*	lb.	.54½	.56½
Merac*	lb.	.75	1.05
Mercaptobenzothiazol	lb.	.44	.46
Mercaptobenzothiazyl Disulfide	lb.	.54	.56
Mertax*	lb.	.55	.62
Methazate*	lb.	—	1.04
Monex*	lb.	—	1.14
Mono Thurad*	lb.	—	1.14
Morfex*	lb.	.65	.67
2-MT	lb.	.88	.90
NA-22* (for neoprene)	lb.	—	1.05
NOBS No. 1*	lb.	.76	.78
Special*	lb.	.80	.82
O-X-A-F	lb.	.55	.57
Pennac SDB*	lb.	.45	.48
Pentex*	lb.	—	1.24
Flour*	lb.	—	.30
Permalux (Neoprene)*	lb.	—	2.25
Phenex*	lb.	.60	.65
Polyac*	lb.	—	1.85
R-2 Crystals*	lb.	—	4.35
Rotax*	lb.	.55	.57
RZ-50-A* and B*	lb.	—	1.00
Santocure*	lb.	.76	.83
NS*	lb.	.80	.87
Selenac* (Ethyl, Methyl)	lb.	—	3.00
Seleram, Ethyl	lb.	—	3.00
Setsit-5*	lb.	.75	1.05
9*	lb.	.85	1.15
SPDX-GH*	lb.	.77	.79
GL*	lb.	1.20	1.30
Tellurac*	lb.	—	1.55
Tepidone*	lb.	.45	.48
Tetrone A*	lb.	—	1.98
Thiate A*	lb.	.88	—
B*	lb.	1.05	1.25
Thiazole ZMBT	lb.	.55	.57
Thiofide*	lb.	.54	.61
S*	lb.	.64	.71
Thionex*	lb.	—	1.14
Thiotax*	lb.	.44	.51
Thiram, Ethyl	lb.	—	1.04
Methyl	lb.	—	1.14
Thurad*	lb.	—	1.14
Thuram E*	lb.	—	1.04
M*	lb.	—	1.14
Cyuram DS & MS	lb.	1.14	1.14
Trimene*	lb.	.56	.62
Base*	lb.	1.03	1.10
Triphenyl Guanidine	lb.	—	.90
Tuads* (Ethyl)	lb.	—	1.04
Tuads* (Methyl)	lb.	—	1.14
Tuex*	lb.	—	1.14
Ultex*	lb.	1.15	1.20
Unads*	lb.	—	1.14
Vulcacure NB*	lb.	.45	.45
NS*	lb.	.75	1.05
TMD*	lb.	—	1.14
ZB*, ZE*, ZM*	lb.	.85	.89
Z-B-X*	lb.	2.45	2.50
Zenite*	lb.	.54	.56
Zenite A*	lb.	.69	.71
Zenite Special*	lb.	.55	.57
Zetax* (uncoated)	lb.	.55	.57
Zimate* (Butyl)	lb.	—	1.04
Zimate* (Ethyl)	lb.	—	1.04
Zimate* (Methyl)	lb.	—	1.04
Zimate Slurry 50% solids content (Butyl, Ethyl & Methyl)	lb.	.85	.89
Ziram, Butyl	lb.	—	1.04
50% Dispersion	lb.	.85	.89
Ziram, Ethyl	lb.	—	1.04
50% Dispersion	lb.	.85	.89
Ziram, Methyl	lb.	—	1.04
50% Dispersion	lb.	.85	.89

ACTIVATORS

Blue Lead Sublimed	lb.	.17¼	.18¼
Cottonseed Fatty Acids			
Drew Wecoline C*	lb.	.17¾	.19
Wochem 210* and 211*	lb.	.16¾	.19¼
Fish Oil, Hydrogenated, Fatty Acid			
DAR-S* (dlvd.)	lb.	.13	.15½
DAR-HY* (dlvd.)	lb.	.15¾	.18¼
Hydrofol Acids* (dlvd.)	lb.	.15	.25¼
Hyfac 430* (dlvd.)	lb.	.18	.20½
Neo-Fat H.F.O.* (dlvd.)	lb.	.14½	.15¾
Neutrex* (dlvd.)	lb.	.15¾	.18¼
Stearite*	lb.	.11¾	.14¾
Talene* (dlvd.)	lb.	.16¾	.19¼
Lime, Hydrated			
Arrowhead*	ton	—	21.00
Marblehead*	ton	—	19.25
Sierra*	ton	—	22.50
Litharge			
Eagle-Picher* (c.l.)	lb.	.18	—
SB* (dlvd.)	lb.	—	.18½
Magnesium Oxide, Heavy			
General Magnesite 500*	lb.	.05½	.06
600*	lb.	.06½	.07
Kaiser 325*	lb.	.057	.073
Michigan No. 15*	lb.	.05½	.06½

ACTIVATORS (Cont'd)

Magnesium Oxide, Light			
Carey Mag*	lb.	.25¼	.26
General Magnesite* (neoprene grade)	lb.	.26¼	.28¼
General Magnesite No. 101*	lb.	.23½	.24½
Genmeg MLW*	lb.	.23½	.24½
K & M* (neoprene grade)	lb.	.29¼	.30
Light Calcined Magnesia No. X-01*	lb.	.25¼	.26
Maglite D*	lb.	.25¼	—
K*	lb.	.25¾	.27
L*	lb.	.29¾	.30¾
M*	lb.	.27	.28½
Marmag*	lb.	.24¾	.26
Michigan No. 30*	lb.	.25¼	.26
Neomag Powder*	lb.	.29¼	.30
Pellets*	lb.	.31¼	.32
Michigan No. 40*	lb.	.29¼	.30
Oleic Acid			
Dar-Chem* 105	lb.	.17¼	.19¾
Drew Wecoline OO*	lb.	.17¾	.19
Emersol 210* (dlvd.)	lb.	.17¼	.19¾
Groco Red Oil	lb.	.17¼	.19¾
Neo-Fat 92-04*	lb.	.20½	.22½
94-04*	lb.	.18½	.20½
Wochem 310, 311	lb.	.17¼	.19¾
Palm Fatty Acids			
Groco 45*	lb.	.15¾	.18¼
Neo-Fat*	lb.	.15¾	.17¾
Wochem 280*	lb.	.15¾	.18¼
281*	lb.	.16¼	.18¾
Potassium Oleate (dms.)	lb.	.48	.73
Drew 24%*	lb.	.20	.73
Red Lead			
Eagle-Picher* (c.l.)	lb.	.19	—
No. 2 RM* (dlvd.)	lb.	—	.18½
Sodium Laurate, 75%*	lb.	.64	.89
Sodium Oleate, 75%*	lb.	.54	.79
Paste (dms.)	lb.	.39	.64
Sodium Stearate, 75%	lb.	.47	.72
Stearic Acid, Single Pressed			
Emersol 110* (dlvd.)	lb.	.16¼	.18¾
Groco 53*	lb.	.16¼	.18¾
Neo-Fat 18-53*	lb.	.14¾	.16¾
Standard Pearlstearic* (dlvd.)	lb.	.16	.18½
Wochem 730*	lb.	.13	.15½
Stearic Acid, Double Pressed			
Choice Pearlstearic* (dlvd.)	lb.	.16	.18½
Emersol 120* (dlvd.)	lb.	.16¾	.19½
Groco 54*	lb.	.16¾	.19¼
Hydrofol Acid 444	lb.	.12¼	.14¾
Neo-Fat 18-54*	lb.	.15¼	.17¾
Wecoline 200*	lb.	.14¾	.16
1000*, 1500*	lb.	.12	.13¾
Wochem 731*	lb.	.15¾	.18¼
Stearic Acid, Other			
Extra Pearlstearic* (dlvd.)	lb.	.17¾	.20¼
Groco*	lb.	.12¼	.14¾
Neo-Fat 18*	lb.	.18½	.20½
18-58*	lb.	.14¼	.16¾
18-61*	lb.	.16¼	.18¾
Stearex* (dlvd.)	lb.	.11¾	.13
Stearite*	lb.	.11¼	.13¾
Wecoline 300*	lb.	.15¼	.16½
Wochem 720*	lb.	.11¾	.14¼
721*	lb.	.11¾	.14¼
732*	lb.	.16¾	.19¼
White Lead Basic Carbonate	lb.	.19	.20
White Lead Basic Sulfate	lb.	.17¾	.18¾
Zinc Laurate			
Laurex*	lb.	.33	.34
Zinc Stearate	lb.	.41	.46
Aquazinc K.C.*	lb.	.30	.55
Crown Brand*	lb.	.39	.44

Unclassified Activators

Actifat* (dms.)	lb.	—	.18
Aktone*	lb.	.21¼	.23¾
Barak*	lb.	—	.65
Curade*	lb.	.57	.59
Dibenzo G-M-F	lb.	—	2.60
D-B-A*	lb.	—	1.95
G-M-F*	lb.	—	2.60
Dibutylamine (dlvd.)	lb.	.55¼	.56½
MODX*	lb.	.38	.40
Neo Fat 42-07*	lb.	.10¾	.12¼
Ridacto* (dms.)	lb.	.25	.26
Snodotte* (dlvd.)	lb.	.20¾	.22¾
Vimbra	lb.	.32	.38½
Vulklor*	lb.	.88	.98

ANTI-COAGULANTS

Aqua Ammonia* (dms.)	lb.	.031	.035
M.B.M.C.* (l.c.l.)	lb.	.54	.76

SOUND ENGINEERING

. . .THROUGHOUT THE WORLD

Since 1940, a total of 74 predip and calendar lines for rayon and nylon tire cord fabric production have been designed and built by C. A. Litzler engineers for leading tire manufacturers throughout the world. In addition to these prime production installations located in 32 countries around the globe, 22 Computreaters — precision laboratory impregnation lines introduced in 1957 — have been built for worldwide customers.

All of these production units are in profitable operation today, and a substantial number of them represent repeat orders based on outstanding performance of an initial unit or line.

Designed for clean, highly accurate and rugged performance, these Litzler units qualify, by actual report of the operating engineers, as requiring the lowest maintenance in the industry.

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LICENSED FABRICATORS: Benno Schilde Maschinenbau A. G., Bad Hersfeld, Germany; Soc. Alsacienne de Constructions Mecaniques, Paris, France; Mather & Platt, Ltd., Manchester, England

ANTI-FOAMING AGENTS

Aero Anti Foam H*	lb.	—	.20
Regular*	lb.	—	.12
Anhydrol 6991*	lb.	.31	.36
D.C. Antifoam A*	lb.	5.45	6.05
Antifoam A Emulsion*	lb.	2.05	2.85
Antifoam AF Emulsion*	lb.	2.05	2.85
Antifoam B*	lb.	.65	1.20
Defoama W-1701*	lb.	—	.14½
Defoamer A-25*	lb.	—	3.00
Defoamer 630*	lb.	—	.14
Deltyl Prime	lb.	.70	.80
Foam-Nix*	lb.	.50	1.25
G-E Antifoam SS-24*; 66*	lb.	5.28	6.65
60 Emulsion*	lb.	2.05	3.75
Igepol CO-210	lb.	—	.36
Kessco X-3* (dms.)	lb.	—	.39
X-180*	lb.	—	.28
X-181*	lb.	—	.36½
Nopco 1407*	lb.	.19½	.21½
1497-V*	lb.	.14¼	.16¼
1907-B*	lb.	.22½	.24½
JMK*	lb.	.48½	.50½
JMU*	lb.	.23¼	.25¼
JMY*	lb.	.21	.23
Pluronic L61*	lb.	.33½	.39
RS-968*	lb.	.38	.38½
Terpinol Prime No. 1	lb.	.35	.50
Tributyl Phosphate (dms.)	lb.	.52½	.53½
UC SAG 47*	lb.	5.25	6.50
470*	lb.	.69	1.20
VL-520*	lb.	2.68	3.50

ANTIOXIDANTS

Agebest 1293-22A*	lb.	1.90	2.00
AgeRite Alba*	lb.	2.40	2.50
Gel*	lb.	.70	.72
Hipar*	lb.	1.05	1.07
H.P.*	lb.	.79	.81
Powder*	lb.	.57	.59
Resin*	lb.	.88	.90
Resin D*	lb.	.57	.59
Spar*	lb.	.57	.59
Stalite & Stalite S*	lb.	.57	.59
Superlite*	lb.	.57	.59
White*	lb.	1.50	1.60
Akroflex C*	lb.	.85	.87
CD*	lb.	.79	.81
Alcogard 354*	lb.	1.40	1.52
Aminox*	lb.	.57	.62
Antioxidant 425*	lb.	2.47	2.50
Antioxidant 2246*	lb.	1.50	1.53
Antox*	lb.	.59	.61
Aranox*	lb.	3.25	3.30
Benzoquinone	lb.	1.50	1.75
Betanox Special*	lb.	.91	.96
B-L-E*	lb.	.57	.62
B-X-A*	lb.	.55	.57
Catalin CAO No. 1*	lb.	.91	.95
CAO No. 3*	lb.	1.05	1.07
CAO No. 5*	lb.	1.49	1.50
CAO No. 6*	lb.	—	3.20
Deenax*	lb.	.95	1.05
Di-tert-Butyl-para-Cresol	lb.	.86	1.16
Eugenol C-95%*	lb.	2.30	2.50
Flectol H*	lb.	.57	.64
Flexamine*	lb.	.79	.84
Ionol* (dms.)	lb.	.91	.95
Neozone A*	lb.	.64	.66
C*	lb.	.86	.88
D*	lb.	.57	.59
Nevastain A*	lb.	.51	.61
B*	lb.	.51	.70
Nullapon BF-12*	lb.	—	.21½
BF-13*	lb.	—	.25½
BF-78*	lb.	—	.55
BF-Acid*	lb.	—	.85
Octamine*	lb.	.57	.62
Oxidex*	lb.	—	3.60
PDA-10*	lb.	.46	.48
Permalux*	lb.	—	2.25
Polygard*	lb.	.52	.62
Santoflex AW*	lb.	.71	.78
DD*	lb.	.57	.64
75*	lb.	1.01	1.08
Santovar-A*	lb.	1.55	1.62
Santowhite Crystals*	lb.	1.55	1.62
Santowhite L*	lb.	.57	.64
MK*	lb.	1.25	1.32
Powder*	lb.	1.55	1.62
Sequestrene AA*	lb.	.70	.80
NA2*	lb.	.59	.66
NA3*	lb.	.58	.65
Stabilite*	lb.	.57	.59
Alba*	lb.	.75	.80
FLX*	lb.	.78	.80
L*	lb.	.65	.67
White*	lb.	.57	.59
White Powder*	lb.	.46	.48
Stabilizer No. 1*	lb.	1.55	1.80
Stabilizer No. 9-A*	lb.	.80	1.05
Styphen I*	lb.	.51	.55
Sunolite*	lb.	.16	.22
Tecquinol*	lb.	.82½	.84½
Tannic Acid, Tech.	lb.	.46	.48
Tenamene 3*	lb.	.91	.95
Thermoflex A*	lb.	1.05	1.07
V-G-B*	lb.	.75	.77
Wing-Stay S*	lb.	.53	.57

ANTIOZONANTS

Eastozone* 30, 31	lb.	1.05	1.09
Fura-Tone NC-1008*	lb.	.28	.39
NC-1012*	lb.	.46	.69
Santoflex AW*	lb.	.79	.86
UOP 88* & 288* (dms.)	lb.	1.05	1.07

ANTI-SCORCHING AGENTS

Armeen HT*	lb.	.34	.40
Good-rite Vultrol*	lb.	.67	.70
Harcopol 1183*	lb.	.70	.74
Retarder PD*	lb.	.37	.39
W*	lb.	—	.46
Sodium Acetate 60-62% Crystals	lb.	.08	.08½

ANTISEPTICS AND GERMICIDES

A.P.C. 6901*	lb.	.32	.38
Arquad S*	lb.	.38	.44
Formaldehyde (dms.)	lb.	.06	.076
G-4* (bbls.)	lb.	1.09	1.29
G-11*	lb.	1.98	2.08
Halane*	lb.	.40	.47
Ortho Cresol (26°—27°)	lb.	.14	.16¼
Preventol GD	lb.	—	1.09
Retarder D*	lb.	.42	.50

ANTI-WEBBING AGENTS (for Latex)

DC 7 Compound*	lb.	5.05	6.50
Webnix 34-L*	lb.	1.25	1.75
57*	lb.	1.50	2.00
69-C*	lb.	1.50	2.00
71*	lb.	1.25	1.75

AROMATICS (DEODORANTS)

Airkem 115*	gal.	—	6.50
122*	gal.	—	6.50
186*	gal.	—	6.50
Alamask AA*	lb.	—	3.00
AF*	lb.	—	2.50
AO*	lb.	—	1.50
AR*	lb.	—	.50
BG*	lb.	—	1.15
BGM*	lb.	—	.60
CY*	lb.	—	2.40
DJ*	lb.	—	3.35
DL*	lb.	—	1.95
H*	lb.	—	5.50
LD*	lb.	—	.75
ND*	lb.	—	2.75
O*	lb.	—	6.50
OS*	lb.	—	5.25
Bouquet 149*	lb.	—	3.00
Coumarin*	lb.	—	3.70
Curodex 19*	lb.	4.75	4.90
188*	lb.	5.75	5.90
198*	lb.	6.75	6.90
Deodorant 65*	lb.	—	1.85
Deodorant L-37*	lb.	2.15	2.25
L-44*	lb.	2.65	2.75
N.L.T.X.*	lb.	1.90	2.00
Deodorant Oil GD 6422*	lb.	1.90	2.20
GD 6423*	lb.	1.60	1.90
GD 6575*	lb.	2.40	2.90
GD 31063*	lb.	2.25	2.75
Ethavan*	lb.	6.20	6.25
Latex Perfume 17326	lb.	—	4.00
18301	lb.	—	3.00
22258	lb.	—	2.50
Naugaromes* (dms.)	lb.	.60	3.00
Neutroleum Delta*	lb.	—	2.25
Gamma*	lb.	—	3.25
Parador A*	lb.	1.80	2.10
C*	lb.	2.00	2.50
E*	lb.	.25	.40
GD 5280*	lb.	2.00	2.50
GD 53481*	lb.	1.70	2.00
Perfume Oil Bouquet Vanilla M*	lb.	1.60	1.70
Rodo No. 0*	lb.	4.00	4.50
No. 10*	lb.	5.00	5.50
Rubbarome* (dms.)	lb.	.60	3.80
Rubber Perfume 12*	lb.	—	4.35
Russian Leather 7*	lb.	—	4.35
Vanillin	lb.	2.75	2.80

BLOWING AGENTS

Ammonium Bicarbonate	cwt.	—	8.00
Better Blend Soda* (c.l., bags)	cwt.	—	2.55
Blowing Agent No. 81105	lb.	.32	.35
Celogen*	lb.	—	1.95
AZ*	lb.	—	1.95
Diazo Amino Benzene	lb.	—	.73
Kempore R-125	lb.	—	1.92
Neo Fat 42-12*	lb.	.10¼	.12¼
Opex 40	lb.	.68	.72
Sodium Bicarbonate, U.S.P. (c.l., bags)	cwt.	—	2.40
Unicel ND*	lb.	—	.72
S*	lb.	—	.20
Urea	lb.	.06	.07

BONDING AGENTS

Base 6986*	lb.	.27	.32
Braze*	gal.	6.00	9.00
Braze Cover Cement*	gal.	2.50	4.00
Chemlok 201, 203, 220, 401, 607	gal.	5.00	24.00
614	lb.	4.35	4.75
Durez 12987*	lb.	.47½	.51½
Gen-Tac Latex*	lb.	.70	.75
Hylene M*	lb.	1.70	2.00
M-50*	lb.	1.00	1.25
Penacolite B1A*	lb.	—	.95
R-2710*	lb.	—	.95
Pliobond 20*	gal.	2.91	4.23
30*	gal.	3.65	4.97

BONDING AGENTS (Cont'd)

Rex Compounds*	gal.	1.30	1.90
Thixons*	gal.	3.30	9.00
Ty-Ply Q (BN & S)*	gal.	6.75	8.00
Tygobond 30*	gal.	4.10	5.40
40*	gal.	5.80	6.89
41*	gal.	8.65	9.85
45*	gal.	5.75	6.48
Vinculux	gal.	—	4.95

COAGULANTS

Acetic Acid—56% (bbls. cwt.		9.00	11.00
Glacial 99½% (dms.)	lb.	.12	.13
Calcium Nitrate, Tech. Flake	lb.	.07½	.09½
Hydroxyacetic Acid—70% (dms.)	lb.	—	.09½
Zinc Nitrate, Tech. Flake	lb.	—	.20

COLORING AGENTS

Black

Aquablak B*	lb.	.09¾	.10¾
M*	lb.	.10½	.11
S*	lb.	.11¾	.12¼
Black Shield 4*	lb.	.09	.09½
No. 5	lb.	.10	.10½
No. 6	lb.	.09	.09½
No. 19	lb.	.11	.11½
L-1404B	lb.	.10½	.11
Carbon Black—See *Reinforcing Agents*			
Cooke 1026*	lb.	—	2.50
Lampblack No. 10* (dms.)	lb.	.06	.09
Mapico Black Iron Oxide* (50 lb. bags)	lb.	.14¾	.15
Pure Black Iron Oxide	lb.	.14¾	.14½

Blue

Akron Masterbatches*	lb.	2.23	2.78
Toners*	lb.	2.30	6.35
Blue Powders	lb.	2.20	3.75
Cooke M.B. Blue*	lb.	2.20	3.75
Disco Blues	lb.	2.20	3.45
Monastral Rubber Blue CPL*	lb.	1.95	1.95
PCD, Dispersed*	lb.	—	2.55
Peacoline Blue*	lb.	—	3.85
Ramapo Blue*	lb.	2.75	3.00
Rubber Blue GD* (Disp.)	lb.	—	4.75
Rubber Blue X-1999*	lb.	—	1.90
Rubber Dispersed Blues	lb.	2.52	2.78
Solfast Blue*	lb.	.75	3.60
Stan-Tone MBS*	lb.	2.20	2.85
GPE*	lb.	—	1.50
PEC*	lb.	.93	1.08
Ultramarine	lb.	.14	.30
Vansul Blue M.B.*	lb.	1.00	2.60

Brown

Brown Iron Oxide	lb.	.15¼	.15½
Mapico Brown* (50 lb. bags)	lb.	.15¾	.16
Stan-Tone GPE*	lb.	—	3.00
Vansul Brown M.B.* (Organic)	lb.	—	2.30

Green

Akron Masterbatches*	lb.	1.38	3.08
Toners*	lb.	1.35	4.95
Cooke M.B. Green*	lb.	1.60	2.80
1013*	lb.	—	2.80
Disco Greens	lb.	1.55	2.80
Green Powders	lb.	1.35	3.95
Monastral Rubber Green GSD* (Dispersed)	lb.	—	2.80
GSL*	lb.	2.20	2.20
Permansa Green CP-1236*	lb.	—	1.35
Pigment Green B*	lb.	1.45	1.45
GL-652D*	lb.	.90	.95
Ramapo Green*	lb.	—	3.50
Rubber Dispersed Greens	lb.	1.23	3.08
Rubber Green FD* (Disp.)	lb.	—	2.05
Rubber Green X-1292*	lb.	—	1.75
Solfast Green*	lb.	—	3.95
Stan-Tone MBS*	lb.	1.55	3.35
GPE*	lb.	—	3.00
PC*	lb.	2.20	2.25
Vansul Green M.B.*	lb.	1.50	3.00

Maroon

Akron Masterbatches*	lb.	—	4.10
Toners*	lb.	2.00	4.00
Pyrolux Maroon*	lb.	—	3.40
Vansul Maroon M.B.*	lb.	—	3.35

Orange

Akron Masterbatches*	lb.	2.42	2.77
Toners*	lb.	2.82	4.00
Benzidene Orange	lb.	—	3.30
Cooke MB*	lb.	2.25	2.35
1021*	lb.	—	2.25
Dianisidine Orange*	lb.	—	2.85
Disco Oranges	lb.	2.30	2.85
Mercadium X-2667*	lb.	—	1.58
Molybdate Orange	lb.	—	.48
Oswego Orange X2065*	lb.	—	3.15
Rubber Orange OD* (Disp.)	lb.	—	2.25
Stan-Tone Cadmium Dry*	lb.	1.85	4.23
Cadmium Paste*	lb.	2.48	2.80
GPE*	lb.	1.20	4.35
PC*	lb.	.75	.80
Vansul Orange M.B.*	lb.	2.40	2.45

Call Hall

HALLCO NEWS

Issued by
The C. P. Hall Co.
Chemical Manufacturers

No. 6

RECLAIM SCORCHED NEOPRENE WITH 4039-Y OIL!

For reclaiming and reconditioning scorched Neoprene, 4039-Y Reclaiming Oil is ideal for both scorched scrap and partly "set-up" stocks.* Tests show that it can also save time and production costs in the reclamation of regular rubber. Only 5% of 4039-Y Reclaiming Oil will completely recondition scorched Neoprene depending on how far such stocks have been set-up. 4039-Y treated stocks can be worked back into the original stock or used as a workaway in other stocks. General properties of 4039-Y Reclaiming Oil are as follows:

Specific Gravity @ 60/60°F.	0.938
Saybolt Universal Viscosity @ 100°F.	40 seconds
Flash Point, C.O.C.	180°F.
Weight per gallon in pounds	7.81
Color	Dark Brown

IMPROVE ADHESION OF CABLE COATINGS WITH 4039 CABLE OIL!

4039-Y Reclaiming Oil is manufactured and distributed by The C. P. Hall Co. 4039 Cable Oil is a polymerizable compound widely used by the cable industry. It surface activates service entrance tape that has become partially cured. A thin wipe of 4039 oil on the cable surface causes insulation compounds to adhere with far greater physical strength. The conductor, when dipped and wiped clean, shows increased brightness and becomes much more receptive to insulation. Primary insulations too, when similarly treated result in greater adhesion of Neoprene and other jacket coatings.

Conducting tapes applied to primary insulation treated with 4039 Cable Oil also exhibit a marked improvement in adhesion properties. 4039 Cable Oil will not upset acceleration systems. It can prove highly effective in proofing where dissimilar polymers are to be coated. . . . For example, a Neoprene skim to a GR-S friction. 4039 Cable Oil is manufactured and distributed by The C. P. Hall Co.

For further information and samples call or write The C. P. Hall Company.

**P.S. Use "Maglite D" in your Neoprene batches and avoid scorching!*

The C. P. Hall Co.
CHEMICAL MANUFACTURERS

AKRON	CHICAGO	MEMPHIS	LOS ANGELES	NEWARK
Phone	Phone	Phone	Phone	Phone
JEfferson	POrtsmouth	JAckson	MAdison	MArket
5-5175	7-4600	6-8253	2-2022	2-2652

COLORING AGENTS (Cont'd)

Red

Akron Masterbatches*	lb.	1.00	-	3.53
Toners*	lb.	.88	-	5.60
Arcturus Reds*	lb.	——	-	1.35
Antimony Trisulfide	lb.	.72	-	.78
R.M.P. Sulfur Free*	lb.	——	-	.78
R.M.P. No. 3*	lb.	——	-	.72
Brilliant Toning Reds*	lb.	1.65	-	1.90
Cadmolith Red* (dms.)	lb.	1.94	-	2.87
Cooke M.B. Red*	lb.	1.05	-	3.25
1010*	lb.	——	-	1.75
Disco Reds	lb.	1.05	-	3.25
Graphic Red* (dlvd.)	lb.	.98	-	1.03
Kroma Reds*	lb.	.14	-	.15
Lake Red C*	lb.	——	-	1.25
Mapico Reds* (50 lb. bags)	lb.	.14¼	-	.14½
Mercadium X-2668 Light*	lb.	——	-	1.65
X-2669 Medium Light*	lb.	——	-	1.73
X-2670 Medium*	lb.	——	-	1.80
X-2671 Dark*	lb.	——	-	1.88
Oximony Red Iron Oxide	lb.	.12¾	-	.13
Polaris Red*	lb.	——	-	1.70
Recco Red Oxide*	lb.	.12	-	.13
Red Iron Oxide, Light	lb.	.13¾	-	.14
Red Powders	lb.	——	-	4.40
Rubber Dispersed Reds	lb.	1.47	-	3.58
Rubber Red PBD* (Disp.)	lb.	——	-	2.05
2BD, Dispersed*	lb.	——	-	2.00
2BL*	lb.	1.24	-	1.24
PBL*	lb.	1.24	-	1.24
Rubanox Reds*	lb.	1.47	-	1.60
Rubber Red CP-339* (dlvd.)	lb.	——	-	1.10
Rubber Red X-1148*	lb.	——	-	.93
Solfast Red*	lb.	1.47	-	1.80
Stan-Tone MBS*	lb.	1.00	-	3.75
GPE*	lb.	.77	-	3.15
PC*	lb.	1.30	-	2.50
PDS*	lb.	1.40	-	1.55
PVC*	lb.	1.65	-	1.90
Vansul Red M.B.*	lb.	1.05	-	3.35
Watchung Red*	lb.	1.90	-	1.90

Tan

Mapico Tan 15* (50 lb. bags)	lb.	.23½	-	.23½
20* (50 lb. bags)	lb.	.23¼	-	.23½

White—Lithopone

Eagle-Picher*	lb.	.0800	-	.0975
Permolith*	lb.	.0837½	-	.0912½
Sanolith*	lb.	.0800	-	.0875

White—Titanium Pigments

Iceberg*	lb.	——	-	.02½
Icecap K*	lb.	——	-	.03¼
Horse Head Anatase Grades*	lb.	.25½	-	.26½
Rutile Grades*	lb.	.27½	-	.28½
Stan-Tone PC*	lb.	.55	-	.60
Ti-Cal*	lb.	.09	-	.09¼
R-22*, R-25*, R-27*, R-30*	lb.	.09¼	-	.09¾
R-60*	lb.	.09¾	-	.10¼
Ti-Pure*	lb.	24½	-	.27½
Anatase Grades*	lb.	25½	-	36½
R-100*, R-500*	lb.	.27½	-	28½
Titanox A*—all grades (dlvd.)	lb.	.25½	-	.26½
C-50* (dlvd.)	lb.	.14⅞	-	.14⅞
RA* (dlvd.)	lb.	.27½	-	.28½
RA-10* (dlvd.)	lb.	.27½	-	.28½
RA-NC* (dlvd.)	lb.	.27½	-	.28½
RC* (dlvd.)	lb.	.09¼	-	.10⅛
RC-HT* (dlvd.)	lb.	.09¾	-	.09⅞
Unitane O-110*	lb.	.25½	-	.26½
O-220*	lb.	.25½	-	.26½
O-310*	lb.	.25½	-	.26½
O-410*	lb.	.25½	-	.26½
OR-150*	lb.	.27½	-	.28½
OR-250*	lb.	.27½	-	.28½
OR-340*	lb.	.27½	-	.28½
OR-342*	lb.	.27½	-	.28½
OR-350*	lb.	.27½	-	.28½
OR-540*	lb.	.27½	-	.28½
OR-640*	lb.	.27½	-	.28½
Zopaque*	lb.	.24½	-	.25½
R*	lb.	.26½	-	.27½

White—Zinc Oxide (American Process)

AZODOX 44, 45	lb.	.1450	-	.1550
AZO-ZZZ 11°, 22°, 33°, 44° 55°	lb.	.1450	-	.1550
Eagle-Picher AAA*	lb.	.1450	-	.1550
Horse Head Special*	lb.	.1450	-	.1550
XX*	lb.	.1450	-	.1550
Protox 166*	lb.	.1450	-	.1550
167*	lb.	.1450	-	.1550
267* (pelleted)	lb.	.1450	-	.1550
St. Joe Black Label*	lb.	.1450	-	.1550
Green Label*	lb.	.1450	-	.1550
Red Label*	lb.	.1450	-	.1550
Pelleted	lb.	.1450	-	.1550

COLORING AGENTS (Cont'd)

White—Zinc Oxide (Dispersed)

Dispersed Zinc Oxide	lb.	——	-	.13

White—Zinc Oxide (French Process)

AZO-ZZZ 66	lb.	.1450	-	.1550
Florence Green Seal*	lb.	.1625	-	.1725
Red Seal*	lb.	.1575	-	.1675
White Seal*	lb.	.1675	-	.1775
Kadox 25*	lb.	.1675	-	.1775
15*, 17*, 72* & 515	lb.	.1450	-	.1550
Protox 168*	lb.	.1450	-	.1550
169*	lb.	.1450	-	.1550
268* (pelleted)	lb.	.1450	-	.1550
U.S.P. (cartons)	lb.	.1775	-	.1875
XX-78*	lb.	.1450	-	.1550

White—Zinc Sulfide

Cryptone ZS*	lb.	.2530	-	.2630
Lehigh 35%*	lb.	.15125-		.16125
50%	lb.	.15375-		.16375

Yellow

Akron Masterbatch*	lb.	1.12	-	2.18
Toners*	lb.	2.10	-	6.00
Benzidene-Lightfast	lb.	3.40	-	5.35
Benzidine Yellow	lb.	1.41	-	2.55
Cadmolith Yellow (dms.)	lb.	1.12	-	1.20
Chrome Yellow	lb.	.35	-	.35
Cooke M.B. Yellow 405*	lb.	2.15	-	2.75
105*	lb.	——	-	2.15
Disco Yellows	lb.	2.05	-	3.95
Iron Oxide, Pure Light Shades	lb.	.12	-	.12¼
Dark Shades	lb.	.11½	-	.11¾
Mapico Yellow* (50 lb. bags)	lb.	.12	-	.12¼
Rubber Dispersed Yellows	lb.	1.27	-	2.13
Rubber Yellow GD* (disp.)	lb.	——	-	2.25
GL*	lb.	——	-	1.68
Rubber Yellow X-1940*	lb.	——	-	2.35
Stan-Tone Cadmium Dry*	lb.	2.80	-	2.98
Cadmium Paste	lb.	1.77	-	1.79
MBS*	lb.	1.30	-	2.20
GPE*	lb.	.77	-	3.25
PC*	lb.	.55	-	3.40
Toluidine Yellow	lb.	2.20	-	2.20
YL-660 D*	lb.	1.25	-	1.35
Oximony Iron Oxide	lb.	.12¾	-	.13
Vansul Yellow M.B.*	lb.	1.15	-	2.15
Yellow Powders	lb.	2.00	-	5.00
Zinc Yellow	lb.	.29	-	.29

DISPERSING AGENTS

Anchoid*(†)	lb.	.24	-	.25
Anhydrapent*	lb.	.56	-	.59
Armeen 18*	lb.	.39	-	.45
Belloid TD*	lb.	.15¾	-	.16¾
Blancol*	lb.	——	-	.15¾
Darvan No. 1*, No. 2*, No. 3*	lb.	.22	-	.35
Daxad 11* (21*, 23*)	lb.	.08	-	.30
Diethanolamine (dms., dlvd.)	lb.	.24½	-	.27
Dispersaid*	lb.	1.25	-	1.35
Emcol K-8300* (dms.)	lb.	.14	-	.18
P10-59	lb.	.32	-	——
5120	lb.	.31	-	——
5138	lb.	.31	-	——
Emulphor ON-870*	lb.	——	-	.55
Farala*	lb.	.06½	-	.07½
Halloid*	lb.	.04½	-	.05½
Igepal CO-630*	lb.	——	-	.29
Igepon T-73*	lb.	——	-	.29½
Kyro EO* (dms.)	lb.	——	-	.29¾
Leonil SA*	lb.	——	-	.55
Lipal No. 9-N*	lb.	.28	-	.29
11-O*	lb.	.28	-	.29
Lomar PW*	lb.	.15¼	-	.15¾
Marasperse C*	lb.	.06¼	-	.06¾
CB*	lb.	.13	-	.15
N*	lb.	.09½	-	.10½
Monoethanolamine (dms., dlvd.)	lb.	.25	-	.27½
Naccotan A*	lb.	.16½	-	.17
Nekal BA-75*	lb.	——	-	.40
BX-78*	lb.	——	-	.64
Nopco 1187-X*	lb.	.15	-	.16
Pluronic F68*	lb.	.38½	-	.44
Polyfon*	lb.	.08	-	.10
R & R 551*	lb.	——	-	.28
Rubbex*	lb.	.247	-	.277
Stablex B*	lb.	.50	-	.95
Stan-Chem BQC*	lb.	.12¼	-	.17¼
1067*	lb.	——	-	.13½
1471*	lb.	.1687	-	.2187
2251*	lb.	.12¼	-	.17¾
Trenamine D-25*	lb.	.32½	-	.36
Triethanolamine (dms., dlvd.)	lb.	.22	-	.25½
Yelkin TT* (and TTS*)	lb.	.13	-	.16

EXTENDERS

Areco 1071-13B*	lb.	.14½	-	.15½
1073-18B*	lb.	.13½	-	.14½
1294-36B*	lb.	.11½	-	.12½
Car-Bel-Ex-A* (and B*)	lb.	——	-	.14
Extender 600*	lb.	——	-	.1870
Facile Gum 4A*	lb.	.48	-	.50
Millex*	lb.	——	-	.07
W*	lb.	——	-	.07

EXTENDERS (Cont'd)

Nopco 2271*	lb.	.16¾	-	.18¾
Polyco 418*	lb.	.17	-	.18
PR-162 Latex Extender*	lb.	——	-	.182
Solvitose HDF*	lb.	.22	-	.25
Synprolac*	lb.	.16	-	.23
Synprowax*	lb.	——	-	.23
Vistanex MM Grades*	lb.	——	-	.35

FILLERS (Inert and Reinforcing)

Abrasives Carbonite*	lb.	.21½	-	1.35
Lionite*	lb.	.16	-	1.27
Pumice	lb.	.03	-	.05
Walnut Shell Grits	ton	60.00	-	110.00
Aluminum Hydrate	lb.	.031	-	.170
Kaiser Alumina*	lb.	.026	-	.059
Aluminum Silicate AFD*	ton	29.50	-	36.00
Aluminum Flake*	ton	29.50	-	36.00
Marter White*	ton	18.50	-	30.00
Barium Carbonate (l.c.l.)	ton	109.00	-	126.50
Barytes No. 1 Floated, White*	ton	55.00	-	79.85
No. 2 Floated, Unbleached*	ton	50.00	-	74.85
No. 22 Barytes* (c.l.)	ton	——	-	30.00
No. 3805 Barytes*	ton	22.00	-	26.75
Foam A*	ton	——	-	55.00
Sparmite*	ton	80.00	-	90.00
XIOR*	ton	80.00	-	90.00
Bentonite (c.l.)	ton	——	-	13.50
Argonite Clay* (c.l.)	ton	——	-	12.50
Bennett Clay* (c.l.)	ton	——	-	32.50
SPV Volclay* (c.l.)	ton	——	-	13.50
White Hi-Gel*	ton	——	-	65.90
Blanc Fixe	ton	125.00	-	142.00
Calcium Carbonate Atomite* (c.l.)	ton	——	-	32.50
B.I. White No. 1 (c.l.	ton	——	-	10.00
Calcene NC*	ton	80.00	-	100.00
TM*	ton	82.50	-	102.50
Calwhite*	ton	——	-	20.00
Camel-Carb*	ton	——	-	14.00
Camel-Tex*	ton	——	-	22.00
Camel-Wite*	ton	——	-	35.00
CCO White*	ton	——	-	22.00
Duramite*	ton	——	-	20.00
Gamaco* (c.l.)	ton	——	-	32.50
Georgia Marble 5-25* (c.l.)	ton	——	-	20.00
No. 10 White* (c.l.)	ton	——	-	11.00
Kalite*	ton	52.50	-	67.50
Laminar*	ton	——	-	30.00
Lexamite* (c.l.)	ton	——	-	27.50
Lorite*	ton	30.00	-	36.00
Millical*	ton	38.00	-	53.00
Multifex MM*	ton	117.50	-	137.50
Non-Fer-Al*	ton	35.00	-	50.00
Purecal M*	ton	56.75	-	80.75
SC* (and T*)	ton	110.00	-	125.00
U*	ton	120.00	-	135.00
PPTD* (c.l.)	ton	——	-	30.00
Rambo No. 1*	ton	——	-	11.50
Snowflake*	ton	——	-	20.00
Super Multifex*	ton	167.50	-	187.50
Surfex*	ton	42.00	-	57.00
Suspenso*	ton	38.00	-	43.00
Witcarb Reg.*	ton	60.00	-	85.00
*	ton	117.50	-	140.00
R*	ton	127.50	-	150.00
RC*	ton	117.50	-	140.00
York White*	ton	——	-	11.50
Calcium Silicate Silene EF*	lb.	.055	-	.065
Calcium Sulfate, Anhydrous Snow White Filler*	ton	——	-	22.00
Calcium Sulfate Hydrous Terra Alba No. 1*	ton	——	-	17.00
Chalk Whiting (l.c.l.)	lb.	.01½	-	.01¾
Recco Paris Whiting*	ton	——	-	35.00
OMYA Whiting*	ton	——	-	30.00
Clay Afton Clay*	ton	13.00	-	38.00
Aiken Clay*	ton	14.50	-	——
Alsilite* (c.l.)	ton	30.00	-	45.00
Aluminum Flake*	ton	25.50	-	28.50
Buca* (c.l.)	ton	——	-	45.00
Burgess No. 20*	ton	——	-	35.00
No. 30*	ton	——	-	37.00
Burgess Iceberg*	ton	——	-	50.00
Icecap K*	ton	——	-	65.00
Catalpo* (c.l.)	ton	——	-	35.00
Champion*	ton	——	-	14.50
Crown*	ton	——	-	14.00
Dixie* (c.l.)	ton	——	-	14.50
Franklin Clay—R* (c.l.)	ton	16.00	-	41.50
G. K. Soft*	ton	11.00	-	28.00
Harwick Clays*	ton	21.50	-	77.00
Hi-White R*	ton	14.50	-	——
Kaolloid Clay* (c.l.)	ton	——	-	10.50
LGB*	ton	17.50	-	22.50
LGP*	ton	20.00	-	25.00
McNamee* (c.l.)	ton	——	-	14.50
Natka 1200	ton	13.00	-	35.00
Par* (c.l.)	ton	——	-	12.00
Paragon*	ton	14.50	-	19.50
Pigment 5*	ton	27.50	-	34.50
33*	ton	——	-	37.00
Recco* (c.l.)	ton	——	-	14.50
Swanee Clay*	ton	——	-	12.50
Snobrite*	ton	——	-	12.50
Suprex*	ton	14.50	-	19.50
Whitetex* (c.l.)	ton	——	-	50.00
Windsor*	ton	14.50	-	39.50
4200 Clay*	ton	13.00	-	——

Now—give neoprene cement a tighter grip, longer tack, more heat resistance.

Add a pinch of permanence—Durez 19428

Some interesting things happen to neoprene solvent cement when you add *Durez 19428*, new heat-reactive phenolic resin produced by the same research and development that made the familiar *Durez 12603* so generally accepted.

In a typical cement formulation, *Durez 19428* added to neoprene steps up adhesion to synthetic fibers such as Dacron, nylon, and rayon—and provides a tighter grip to glass, metals, and unplasticized plastic films, as well.

Add *Durez 19428* resin and a small amount of magnesium oxide, and the uncured cement bond becomes more resistant to heat. Its heat resistance grows as you add more resin. The bond becomes even more heat resistant if cured at 200° F.

Longer tack retention, better fabric life

In a cement formulated for good initial tack and tack retention, adding *19428* prolongs the tack retention period. The resin also minimizes the tendency of bonded fabrics, such as cotton and rayon, to deteriorate in sunlight. As little as 10 parts of *19428* per 100 of neoprene can retard the tendency of many cements to change viscosity when stored.

You'll find this new resin has good compatibility with all types of neoprene. It has infinite solubility in toluene, VM&P naphtha, methyl ethyl ketone, acetone, and carbon tetrachloride, and is soluble up to 12.5% resin solids in mineral spirits.

The resin is stable and stores well in cool, dry conditions. It comes to you in crushed form, in standard 51-gallon fiber drums containing 325 lbs. net.

To see what *Durez 19428* can do for your cement formulations, use the coupon now to request a sample. Ask also for Service Bulletin 305, which describes the recommended compounding and mixing methods.

What can this new resin do for your neoprene cement? To find out quickly, check here. We'll send you:

☐ Evaluation sample of *Durez 19428* ☐ Technical data sheet
☐ Service Bulletin 305—compounding and mixing suggestions

Clip, attach to your business letterhead, with your name, title, company address, and mail to us today.

DUREZ PLASTICS DIVISION

HOOKER CHEMICAL CORPORATION

108 WALCK ROAD, NORTH TONAWANDA, N.Y.

HOOKER CHEMICALS PLASTICS

FILLERS (Cont'd)

Diatomaceous Earth	ton	30.00	- 50.00
Celite 270	ton	55.00	-121.00
292	ton	36.00	- 95.00
Kaylorite* (c.l.)	ton	——	- 30.00
Lorite*	ton	——	- 36.00
Flock			
Cotton (White)	lb.	.26	- .28
Colored	lb.	.12	- .26
Filfloc F 40-9000*	lb.	——	- .13
F 6000*	lb.	——	- .36
Polycel*	ton	10.00	-210.00
Rayon, Bleached or Dyed	lb.	.75	- 1.20
Rayon, Grey	lb.	——	- .18
Rayon, Pink	lb.	——	- .20
Solka-Floc* (l.c.l.)	lb.	.07	- .16
Glue, Amber	lb.	.17	- .19
Ground Softwood Bark			
Silvacon* (c.l.)	ton	55.00	-100.00
Leather			
Flour (dust)	lb.	.12	- .15
Shredded	lb.	.05	- .17
Lignin	lb.	.06	- .08
Indulin*	lb.	.06	- .08
Limestone, Pulverized	ton	3.00	- 5.00
Asbestol Regular*	ton	27.00	- 29.00
Asbestol Superfine*	ton	32.00	- 34.00
Georgia Marble No. 10*	ton	——	- 11.00
Industrial Filler No. 100*	ton	——	- 7.75
Micro Velva A*	ton	49.00	- 51.00
L*	ton	57.00	- 59.00
No. 1 White*	ton	——	- 11.00
Magnesium Carbonate	lb.	.10½	- .13
K & M Clearcarb*	lb.	——	- .14
Technical* (c.l., eqld.)	lb.	.10½	- .12
Marinco CL*	lb.	.11	- .13
Magnesium Silicate (see Talc)			
Mica	lb.	.01¼	- .07¾
Concord*	lb.	.08	- .08¾
Micro-Mica*	lb.	.08	- .08¾
Mineralite* (c.l.)	ton	40.00	- 85.00
Silversheen*	lb.	.08	- .08¾
Triple A Mica* (c.l.)	ton	——	- 35.00
Vermiculite*	lb.	——	- .11
Wet Ground Biotite Mica	lb.	.06½	- .07¼
Wet Ground Mica No. 160*	lb.	.08	- .08¾
Pecan Shell Flour			
Stan Shell*	ton	45.00	75.00
Pyrophyllite			
No. 261*	ton	——	- 11.50
Pyrax A* (c.l.)	ton	14.50	- 15.00
WA* (c.l.)	ton	17.00	- 17.50
Sawdust, Graded	ton	14.00	- 35.00
Silica	ton	16.00	- 27.00
Extra Fine (bags) (c.l.)	ton	——	- 43.00
Slate, Powdered (l.c.l.)	ton	15.00	- 20.00
Lo-Micron Slate Flour*	lb.	——	- .04½
No. 133 Slate Flour*	ton	——	- 4.55
Sodium Silico Aluminate			
Zeolex 23*	lb.	.06	- .07
Talc (Magnesium Silicate)			
Asbestol Regular*	ton	——	- 27.00
Eastern RC-500*	ton	——	- 32.00
No. 41*	ton	——	- 19.70
No. 549*	ton	——	- 63.00
French*	ton	——	- 59.00
No. 367*	ton	——	- 13.00
No. 1600*	ton	——	- 70.60
No. 1768*	ton	——	- 13.00
Nytal 200* (c.l.)	ton	——	- 28.00
300* (c.l.)	ton	——	- 38.00
Sierra Fibrene C-400*	ton	33.00	- 38.00
Sierra Supreme 325*	ton	48.75	- 57.25
Sierra White*	ton	20.75	- 31.75
Soapstone*	ton	——	- 13.00
Walnut Shell Flour	ton	55.00	-100.00
Agrashell*	ton	55.00	-115.00
Stan-Shell*	ton	50.00	-100.00
Whiting, Commercial	ton	——	- 7.50
Allied Whiting*	ton	10.50	- 21.50
Camel-Carb*	ton	——	- 10.00
Calwhite (c.l.)	ton	——	- 20.00
C-C-O White*	ton	——	- 22.00
Georgia Marble No. 15*	ton	——	- 20.00
No. 16*	ton	——	- 20.00
Piqua No. 1 YAA* (c.l.)	ton	10.00	- 10.00
No. 2 LS* (c.l.)	ton	10.00	- 10.00
Snowflake* (c.l.)	ton	——	- 20.00
Stan-White 325*	ton	11.50	- 14.10
Ultrasil*	lb.	.35	- .50
Vitrox* (c.l.)	ton	——	- 11.50
Welco* (c.l.)	ton	——	- 10.50
York White R* (c.l.)	ton	——	- 11.00
Wood Flour	ton	31.50	- 48.00

FINISHING MATERIALS, SURFACE

Besco Finishes*	gal.	2.10	- 2.35
Black Out*	gal.	4.50	- 8.00
Shellac, Orange Gum	lb.	.40	- .50
VanWax*	gal.	1.45	- 1.50

FLAME RETARDANTS

Celluflex CEF* (dms.)	lb.	——	- .65
Chlorowax 40*	lb.	.15	- .17½
50*	lb.	.16	- .18½
70*	lb.	.18½	- .20
Halowax*	lb.	.36	- .46
Zinc Borate 3167*	lb.	.1920	- .2020
Zyrox Compounds*	lb.	.38	- .95½

LATEX MODIFIERS

Ludox	lb.	.15	- .16¾
OPD-101*	lb.	.29	- .36
Piccopale A-1 Emulsion	lb.	.086	- .113
Ubatol U-2001* (t.c.)	lb.	.166	- .187
U-2003* (t.c.)	lb.	.184	- .208
U-2007* (t.c.)	lb.	.166	- .187
U-3025* (c.l.)	lb.	.223	- .235
U-3040* (c.l.)	lb.	.260	- .272
U-3045* (c.l.)	lb.	.260	- .272
U-3050* (c.l.)	lb.	.195	- .207

LUBRICANTS, MOLD

Akro Gel*	lb.	——	- .165
Alipal CO-433*	lb.	——	- .20
CO-436*	lb.	——	- .24
Aluminum Stearate Crown Brand*	lb.	.37	- .42
Amine, Mixed Crude*	lb.	.19	- .25
Aquadag*	lb.	3.50	- 4.00
Aquarex D*	lb.	——	- .81
L*	lb.	——	- .94
ME*	lb.	——	- .82
MDL*	lb.	——	- .33
WAQ*	lb.	——	- .22
Armeen HT*	lb.	.34	- .40
180*	lb.	.52	- .56
Armid HT (flaked)*	lb.	.42	- .46
0*	lb.	.39	- .41
Borax, Granular (l.c.l.)	ton	89.00	- 94.00
Carbowax 4000*	lb.	.31	- .32
CD Mold Release B*	gal.	5.00	——
B-2*	gal.	5.00	——
Colite Concentrate* (dms.)	gal.	.90	- 1.15
Colite D43D*	gal.	1.15	- 1.40
Concentrex*	lb.	——	- .25
Dag Dispersions No. 197*	lb.	1.85	- 2.90
D.C. 7 Compound*	lb.	5.05	- 6.50
D.C. Emulsion No. 7*	lb.	1.59	- 2.07
No. 8*	lb.	1.20	- 1.74
No. 35*	lb.	1.20	- 1.74
No. 35A*	lb.	1.20	- 1.74
No. 35B*	lb.	1.20	- 1.74
No. 36*	lb.	1.20	- 1.74
D.C. Mold Release Fluid*	lb.	3.04	- 3.61
Dri-Lube*	lb.	——	- .22
Dryflo* (bags)	lb.	21.40	- 21.55
Emulsion Lubricant A80*	lb.	——	- 1.20
45*	lb.	——	- 1.20
G-E Silicone Emulsion SM-55*	lb.	1.18	1.74
SM-61*	lb.	1.18	- 1.74
SM-62*	lb.	1.18	- 1.74
G-E Silicone Fluid SF-92*	lb.	3.04	- 4.25
SF-96*	lb.	3.04	- 4.25
Hawkeye Flake* (dlvd.)	lb.	.15	- .15¾
HSC No. 35*	lb.	1.22	- 2.46
No. 515	lb.	1.22	- 2.46
Igepal CO-430*	lb.	——	- .29
CO-630*	lb.	——	- .29
CO-530*	lb.	——	- .29
Igepon AP-78*	lb.	——	- .48
T-33*	lb.	——	- .21
T-51*	lb.	——	- .13½
Kokoboace R*	lb.	.17½	- .18½
Lipal 9-N*	lb.	.28	- .29
7-O*	lb.	.29	- .30
Lubrex	lb.	.25	- .30
Lubri-Flo*	gal.	10.00	- 12.00
Migralube*	lb.	——	- .35
ML-1027-2C*	gal.	——	- 2.65
ML-1028-2C*	gal.	——	- 2.65
Mold Lubricant No. 72 Conc.* (dms.)	gal.	——	- 1.90
Mold Lubricant No. 735* (dms.)	gal.	——	- 1.25
No. 769* (dms.)	gal.	——	- 1.20
No. 825* (dms.)	gal.	——	- 2.00
No. 856* (dms.)	gal.	——	- 1.90
No. 880* (dms.)	gal.	——	- 1.19
No. 887* (dms.)	gal.	——	- 1.80
No. 935* (dms.)	gal.	——	- 1.56
No. 956* (dms.)	gal.	——	- 2.50
No. 965* (dms.)	gal.	——	- 2.15
No. 967* (dms.)	gal.	——	- 2.40
No. 969* (dms.)	gal.	——	- 1.50
No. 975* (dms.)	gal.	——	- 2.85
No. 980* (dms.)	gal.	——	- 1.53
No. 987* (dms.)	gal.	——	- 2.45
A 187* (dms.)	gal.	——	- 1.90
A 256* (dms.)	gal.	——	- 1.20
A 988* (dms.)	gal.	——	- 2.60
Moldeze No. 3*	gal.	——	- 4.95
Mold-Brite*	gal.	——	- 1.50
Monopole Oil MD*	lb.	——	- .16
MR-22 Silicone Semi-Permanent	gal.	9.95	- 14.95
Olate Flakes*	lb.	.23½	- .24¾
Orvus WA Paste* (dms.)	lb.	——	- .23¼
Plaskon Polyethylene S*	lb.	.32	- .47
Poly-Brite PE-20	lb.	.28	- .42
600	lb.	.42	- .58
Poly-Cone 125X	lb.	1.20	- 1.40
1,000	lb.	.93	- 1.06
Polyglycol 15-200*	lb.	.25	- .28¾
E4000*	lb.	.31	- .37
Prodag*	lb.	.30	- .52
Purity Flake* (dlvd.)	lb.	.18¾	- .19¾
Rubber-Flo*	gal.	1.25	- 2.00
Rubber-Glo*	gal.	——	- .94
Rusco Mold Paste*	lb.	——	- .25
Sericite* (l.c.l.)	ton	65.00	- 75.00
Silicone Oil A145*	lb.	3.22	- 3.61
A220* (dms.)	lb.	——	- 2.80
Silrex (dms.)	lb.	——	- .65
A65*	lb.	2.50	- 2.75

LUBRICANTS, MOLD (Cont'd)

Soybean Lecithin	lb.	.13	- .17
Thermalube*	lb.	——	- .13¾
UC Silicone L-45*	lb.	3.04	- 4.75
L-522*	lb.	2.68	- 3.50
LE-45*	lb.	1.20	- 1.70
LE-450*	lb.	1.20	- 1.70
Ucon Lubricants*	lb.	.26¾	- .27¾
Ulco Mold Soap*	lb.	.19	- .29

LUBRICANTS, RUBBER

Diglycol Stearate Neutral (and SE) (dms.)	lb.	——	- .25
Extrud-o-Lube*	gal.	1.33	- 1.54
G.B. Naphthenic Neutrals*	gal.	.11	- .18
Ivory Chips*	lb.	.19¾	- .20¾
Latex-Lube GR* (dlvd.)	lb.	.19¼	- .20
No. 82-A* (450 lb. dms.)	lb.	——	- .08½
Propylene Stearate (dms.)	lb.	.35	- .60

LUBRICANTS, RUBBER SURFACE

Barium Stearate	lb.	.41	- .46
Calcium Stearate	lb.	.39	- .44
Crown Brand*	lb.	.37	- .42
D.C. 7 Compound*	lb.	5.05	- 6.50
D.C. 200 Fluid*	lb.	3.04	- 3.61
ELA*	lb.	——	- .82
G-E Silicone Fluid SF-92*	lb.	3.04	- 4.25
Glycerized Lubricant*	gal.	1.25	- 1.40
Glydag B*	lb.	1.50	- 2.10
Glyso-Lube* (dms.)	lb.	——	- .14
No. 3* (dms.)	lb.	——	- .14
HSC No. 35*	lb.	1.28	- 1.34
No. 515*	lb.	1.28	- 1.34
Hydro-Zinc*	lb.	——	- .20
Latex-Lube Pigmented* (dlvd.)	lb.	.17¼	- .18¾
R-66*	lb.	——	- .16½
Liqui-Lube* (dlvd.)	lb.	——	- .16¾
N.F.* (dlvd.)	lb.	——	- .16¾
N.T.* (dlvd.)	lb.	——	- .16¾
Lubrex*	lb.	.25	- .30
Lubri-Cote	gal.	.86	- 1.00
Magnesium Stearate	lb.	.42	- .47
Crown Brand*	lb.	.40	- .45
Polyethylene Glycol	lb.	.22	- .26
Rubber Free (Concentrate)*	gal.	——	- 1.44
Jel*	lb.	.18	- .21½
Separex*	lb.	——	- .10½
Slab-Dip* (dms.)	lb.	——	- .17
Soybean Lecithin	lb.	.13	- .17
Stock-Lube*	lb.	——	- .19
UC XL-42*	lb.	3.14	- 4.75
XLE-42*	lb.	1.22	- 1.70
XLE-420*	lb.	1.22	- 1.70
Zinc Stearate	lb.	.41	- .46

MOLD CLEANERS

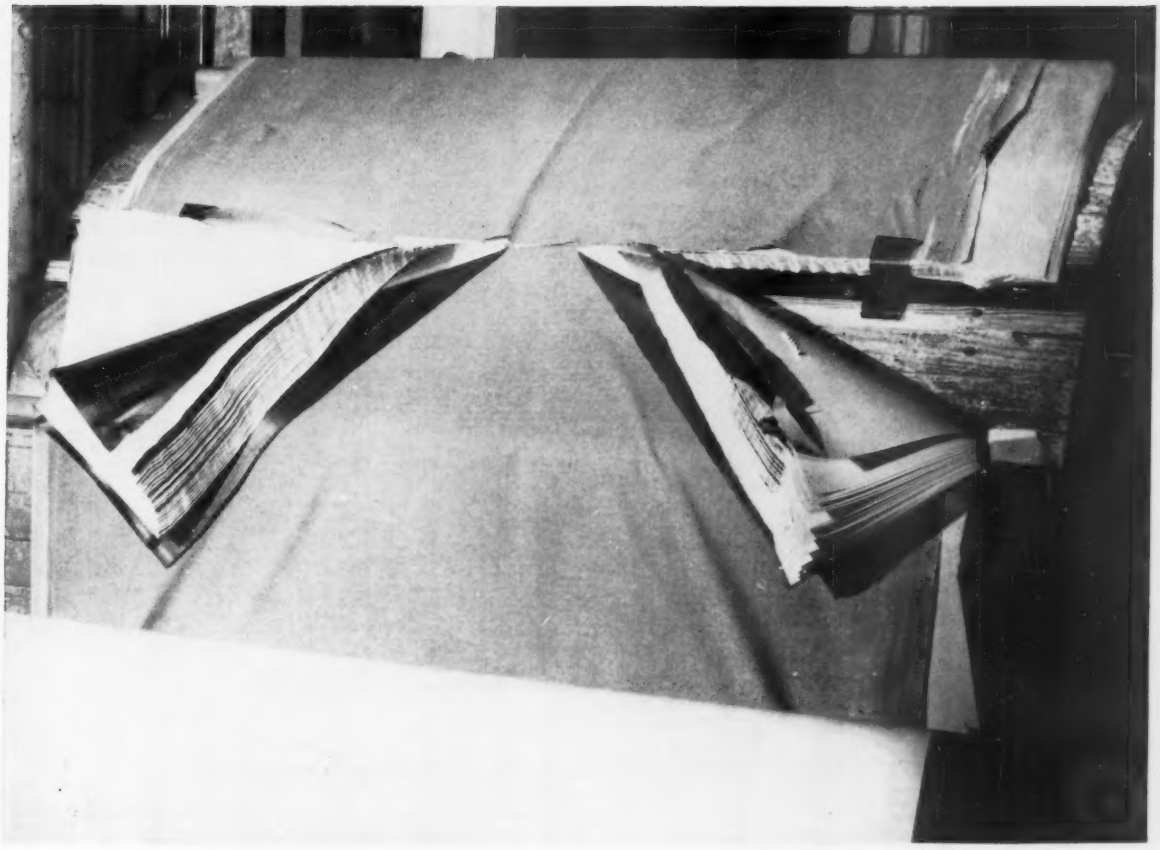
Actusol* (dlvd.)	gal.	1.45	- 1.65
Alkon* (dlvd.)	lb.	.16	- .16½
CA-301*	gal.	——	- 2.49
CA-302*	gal.	——	- 2.63
G-O 6910*	lb.	.38	- .40
Metso Anhydrous*	cwt.	5.70	- 7.95
Metso 99*	cwt.	5.00	- 7.25
200*	cwt.	6.70	- 8.95
Granular*	cwt.	4.45	- 6.70
Orvus Extra Granules*	lb.	.23¼	- .24¾
Polo*	lb.	.12¾	——
Rubber-Sol*	gal.	2.97	- 3.97
Shelblast*	lb.	.04	- .08¼
Sprex A.C.* (dlvd.)	lb.	.17¾	- .18¾
Zip Mold Cleaner*	gal.	1.05	- 1.55

PEPTIZING AGENTS

Peptizer P-12*	lb.	.95	- 1.25
Pepton 22 Plasticizer*	lb.	.83	- .86
65*	lb.	1.23	- 1.26
65B*	lb.	.83	- .86
Pitt-Consol 640 (dms.)	lb.	.37	- .42
RPA 2*	lb.	——	- .85
3*	lb.	——	- .51
3 Conc.*	lb.	——	- .85
5*	lb.	——	- 1.10
6*	lb.	——	- 1.66

PLASTICIZERS & SOFTENERS

Acto 500*	lb.	——	- 09
Adipol BCA*	lb.	.45	- .45½
2EH*	lb.	.42½	- .43½
10A*	lb.	.42½	- .43½
ODY*	lb.	.45½	- 46½
810*	lb.	.42½	- .43½
XX*	lb.	.42½	- .43½
Admex 562 (dms.)	lb.	.50¾	- .51¼
710 (dms.)	lb.	.35¾	- .36¼
711 (dms.)	lb.	.37¾	- .38¼
744 & 745 (dms.)	lb.	.41¾	- .42¼
760 (dms.)	lb.	.59¾	- .60¼
761 (dms.)	lb.	.46¾	- .47¼
770 (dms.)	lb.	.42¼	- .43



LINERETTE PLIES UP PROFITS

Linerette separating paper plied up with frictioned stock before being cut in the clicking operation, saves time and money. Since 1925 Linerette, the specially processed separating paper, has been used with steadily increasing acceptance. It assures clean, fast separation without adhesion and contains no oil or wax. Here is how Linerette can help you:

- Preserves tack.
- Protects lightweight stock in shipment—no fabric needed.
- Keeps stock free of cloth marks or impressions.
- Clippings may be mixed with scrap and worked away when used in die-cutting operations.
- Where cleanliness is essential, Linerette is a low cost lining for trays and containers.
- Stocks can be calender-fed into it.
- Used with most types of lightweight stocks in sheets or strips.

Linerette is available in any width up to and including 54," in rolls of 9", 11½", 13" and 15" diameters, on cores of 3" i.d. The yield is approximately six square yards to the pound. A 9" roll contains 375 linear yards and a 15" diameter about 1150 linear yards. Ask for a sample today, just specify desired width.

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CLIMCO

LINERETTE
INTERLEAVING PAPER

MADE BY THE MANUFACTURERS OF *CLIMCO* PROCESSED LINERS

PLASTICIZERS & SOFTENERS (Cont'd)

Anhydrol 6990*	lb.	.51	- .56
Arneel SD*	lb.	.34	- .40
Arolene 1980* (c.l.)	lb.	—	- .10
Aromatic Plasticiser 10* (and 25*) (dms.)	lb.	.06	- .07½
Aromatic Tar	gal.	.0573	- .1973
Bardol*	lb.	.02¾	- .03¾
B*	lb.	.06¼	- .06½
Bayol D*	gal.	—	- .382
F*	gal.	—	- .52
Bearflex 1751*	lb.	.15	- .18½
Beeswax, Bleached	lb.	73	- .75
Yellow Refined		.64	- .65
Bondogen*	lb.	.55½	- .60½
B.R.C. No. 20*	lb.	.0150	- .0175
No. 21*		.02¾	- .03
No. 22*		.02½	- .02¾
B.R.H. 2*	lb.	.0213	- .0351
BRS 700*	lb.	.0200	- .0285
B.R.T. 3*	lb.	.0180	- .0265
4*	lb.	.0250	- .0260
7*	lb.	.0300	- .0310
B.R.V.*	lb.	.0475	- .0565
Bunarex Resins*	lb.	.07	- .08
Bunatak AH*	lb.	—	- .00½
N*	lb.	—	- .31
U*	lb.	—	- .17½
No. 90*	lb.	—	- .09
No. 210*	lb.	—	- .14
Butac*	lb.	.12½	- .13½
Butyl Carbitol Periargonate (dms.)	lb.	—	- .64½
Butyl Cellosolve Periargonate (dms.)	lb.	—	- .68
Butyl Oleate	lb.	.25½	- .26½
Butyl Palmitate	lb.	—	- .26½
Butyl Stearate (dms.)	lb.	.23½	- .25
Califlux 510* (and 550*)	lb.	.02¾	- .03¾
G.P.*	lb.	.01½	- .02½
R-100*	lb.	.04¾	- .05¾
TT*	lb.	.0195	- .0295
Candelilla Wax, Prime	lb.	.53	- .64
Refined Light	lb.	.56	- .57
Carbowax 4000* (dms.)	lb.	.68	- .70
Cardolite NC-103*	lb.	.36	- .59
Carnauba Wax, Crude	lb.	.72	- .74
Flaked	lb.	.73	- 1.25
Refined, Technical	lb.	.73	- .74
Refined, Pure	lb.	.80	- .88
Yellow	lb.	1.22	- 1.26
Celluflex* (dms.)			
112* (t.c., dlvd.)	lb.	—	- .32½
179-A* (t.c., dlvd.)	lb.	—	- .32½
179-C* (t.c., dlvd.)	lb.	—	- .32½
179-EG* (t.c., dlvd.)	lb.	—	- .32½
DBP* (t.c., dlvd.)	lb.	—	- .30
DOP* (t.c., dlvd.)	lb.	—	- .28½
TPP* (dms., eqld.)	lb.	—	- .40
Ceresin Wax	lb.	.12	- .30
Chlorowax 40*	lb.	.15¼	- .17½
50*	lb.	.16	- .18½
70*	lb.	.18½	- .20
LV*	lb.	.16	- .19½
CTLA Polymer*	gal.	.20	- .36
Cumar Resins*	lb.	.07	- .19
Darex DBM*	lb.	.30½	- .34
DBP*	lb.	.30	- .33½
DOP*	lb.	.30½	- .33½
DIOP*	lb.	.30½	- .33½
D.B.M.*	lb.	.32	- .34¼
Decylbutyl Phthalate	lb.	.27	- .29½
Dogras, Common	lb.	—	- .14
Diallyl Phthalate	lb.	.51½	- .52½
Dibenzyl Sebacate (dms.)	lb.	.93	- .93½
Dibutoxyethyl Sebacate	lb.	—	- .56¼
Dibutyl Phthalate (dms.)	lb.	.28½	- .30
Dibutyl Sebacate	lb.	.67½	- .68½
Dicapryl Adipate (dms.)	lb.	.41½	- .42½
Dicapryl Phthalate (dms.)	lb.	.29	- .30
Dicapryl Sebacate	lb.	.58	- .59½
Di-Carbitol Phthalate (dms.)	lb.	.49	- .49½
Dicyclohexyl Phthalate	lb.	.58¼	- .59¼
Diethyl Phthalate (dms.)	lb.	.27½	- .29
Di-2-ethylhexyl Phthalate (dms.)	lb.	.27½	- .29
Dihexyl Adipate (dms.)	lb.	.46½	- .47½
Dihexyl Phthalate (dms.)	lb.	.32½	- .33½
Dihexyl Sebacate (dms.)	lb.	.66	- .66½
Diisobutyl Azelate	lb.	—	- .47¼
Di-iso-octyl Adipate	lb.	.42½	- .44
Dimethyl Phthalate (dms.)	lb.	.27½	- .29
Dimethyl Phthalate	lb.	.32	- .33
Dimethyl Sebacate (dms.)	lb.	1.30	- 1.30½
Dinonyl Adipate	lb.	.44½	- .47½
Dinopol 235*	lb.	.36	- .37
IDO*	lb.	.31	- .32
MOP*	lb.	.31½	- .32½
Dioctyl Adipate (dms.)	lb.	.42½	- .44
Dioctyl Phthalate (dms.)	lb.	.27½	- .29
Dioctyl Sebacate (dms.)	lb.	.61¾	- .63¼
D.I.O.P. (dms.)	lb.	.27½	- .29
Dipolymer Oil	gal.	.33	- .48
Dispersing Oil No. 10*	lb.	.06	- .06¼
Dutrex* 1, 6, 7	gal.	.18	- .23
6H	gal.	.13	- —
15E	gal.	.11	- .23
20, 25	lb.	.03	- .06
33	gal.	.21	- .33
Elastex 10-P*	lb.	.30½	- .33½
50-B*	lb.	.25	- .28
DCHP*	lb.	.59	- .60
Emulphor EL-719*	lb.	—	- .58
Epoxy Plasticizer	lb.	.33½	- .36
Drapex 3.2*	lb.	.39¼	- .40¼
Drapex 4.4*	lb.	.34¾	- .35¾
Drapex 7.7*	lb.	.37	- .38

PLASTICIZERS & SOFTENERS (Cont'd)

Esparto Wax	lb.	—	- .55
Estac*	lb.	—	- .16
Facile Gum 4A*	lb.	.48	- .50
Flexol B-400*	lb.	.27½	- .28½
DOP*	lb.	.30½	- .31½
TOF*	lb.	.45½	- .46½
3GH*	lb.	.46	- .46¾
3GO*	lb.	.55	- .55¾
4GO*	lb.	.35	- .36
426*	lb.	.29½	- .30½
Flexricin P-1*	lb.	.33½	- .36½
P-4*	lb.	.30½	- .33¼
P-6*	lb.	.37	- .40
P-8*	lb.	.30¼	- .33¼
Fortex A* (dms.)	lb.	.12½	- .14½
Fura-Tone NC-1008*	lb.	.28	- .39
Galex W-100*	lb.	.15½	- .19¾
G.B. Asphaltic Flux*	gal.	.0970	- .1770
G.B. Light Process Oil*	lb.	.02¾	- .03¾
Medium Process Oil*	lb.	.03¾	- .04¾
G.B. Naphthenic Neutrals*	gal.	.12½	- .21½
Good-rite GP233*	lb.	.40	- .43½
GP235*	lb.	.40	- .43½
GP236*	lb.	.40	- .43½
GP261*	lb.	.28	- .31½
GP265*	lb.	.28½	- .32
GP266*	lb.	.29	- .32½
GP-266-BPA*	lb.	.29	- .32½
Hallco C-255-NS*	gal.	.27½	- .29½
C-566*	lb.	.11	- .13
Harflex 300* (dms.)	lb.	.60½	- .61½
325* (dms.)	lb.	.45	- .46
375* (dms.)	lb.	.76	- .77
500* (dms.)	lb.	.34	- .35
HB20*	lb.	.15	- .17
HB40*	lb.	.21	- .22
Herron-H.T.*	gal.	.16	- .27
Herron-Plas*	lb.	—	- .03¾
Herron-Wax*	lb.	.05¼	- .06
No. 23*	lb.	.08¼	- .08¾
No. 24*	lb.	.07¼	- .07¾
HSC No. 13*	lb.	.25	- .32
No. 28 and 38*	lb.	.20	- .27
Indonex 632½* (633½*, 634½*, 637½*)	gal.	.12	- .19
Isooctyl Decyl Phthalate (dms.)	lb.	.28¼	- .30
Kapsol*	lb.	.35	- .35½
Kenflex A & N*	lb.	.19	- .34
Kesscoflex BCL* (dms.)	lb.	—	- .37
BCO* (dms.)	lb.	—	- .33
BCP* (dms.)	lb.	—	- .36
BCS* (dms.)	lb.	—	- .32
BO* (dms.)	lb.	—	- .28¼
BS* (dms.)	lb.	—	- .27½
DBT* (dms.)	lb.	—	- .68
DIOA* (dms.)	lb.	—	- .43½
DOA* (dms.)	lb.	—	- .43½
MCO* (dms.)	lb.	—	- .35½
MCP* (dms.)	lb.	—	- .41
MCS* (dms.)	lb.	—	- .35
TRA* (dms.)	lb	—	- .40
KP 23*	lb.	.31½	- .32½
90*	lb.	.42½	- .43½
140*	lb.	.48	- .48½
201*	lb.	.58	- .59
220* & 260*	lb.	.35½	- .36½
666*	lb.	.59½	- .60
Kremol 40*	gal.	.36	- .46
50*	gal.	.39	- .49
Kronisol* (dms.)	lb.	.33	- .36
Kronitex AA* (dms.)	lb.	.35	- .36
I* (dms.) and K-3*	lb.	.35	- .36
MX*	lb.	.35	- .36
Lanolin, Tech. Anhydrous	lb.	—	- .26
Latex-Lube G.R.*	lb.	.19¼	- .20
Lead Oleate	lb.	—	- .29¾
Lindol* (dms., t.c.)	lb.	—	- .32½
Locusol No. 1-6980*	lb.	.30	- .34
2-Mercaptoethanol (dms.)	lb.	1.25	- 1.50
Methox*	lb.	.40½	- .41
Methyl Laurate	lb.	.25	- .27
Methyl Oleate	lb.	—	- .20
Methyl Stearate (dms.)	lb.	—	- .30
Monoplex DOS*	lb.	.59½	- .60½
DBS*	lb.	.65½	- .66½
S-70*	lb.	.41	- .42
S-71*	lb.	.46½	- .47½
Montan Wax, Crude	lb.	.22	- .29
Flaked	lb.	.29	- .29
Morflex*	lb.	.32	- .69½
Natac*	lb.	.12	- .13
Nebony Resins* (dms.)	lb.	.04½	- .05
Neolene 210* (t.c.)	lb.	—	- .16
212* (t.c.)	lb.	—	- .14
220* (t.c.)	lb.	—	- .15
Nerium*	lb.	—	- .09
Nevillac Resins* (dms.)	lb.	.31	- .85
Neville LX-880* (dms.)	lb.	.12	- .13½
LX-685* (dms.)	lb.	.12½	- .17½
Neville Resins* (dms.)	lb.	.07¼	- .20
Nevindene Resins* (dms.)	lb.	.16½	- .20
Nevinol* (dms.)	lb.	—	- .24
Nuba 1* (and 2*) (dms.)	lb.	.06¼	- .06¾
No. 480 Oil Proof Resin*	lb.	—	- .18
Ohopex Q10* (dms.)	lb.	.30½	- .31½
R9* (dms.)	lb.	.37¼	- .37¾
Ortho-Nitrobiphenyl	lb.	.13	- .15
Ozokerite Wax, White and Yellow	lb.	.24	- .31
Paradene Resins (dms.)	lb.	.07¼	- .08
No. 2 Flaked	lb.	.08	- .08½
Para Flux* (dms.)	gal.	.22	- .25
2016* (dms.)	gal.	.22	- .26
Para Lube* (t.c.l.)	lb.	.046	- .048

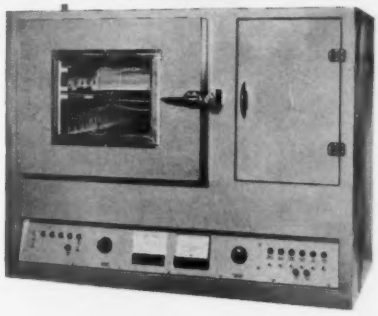
PLASTICIZERS & SOFTENERS (Cont'd)

Paraplex G-25*	lb.	.76	- .77
G-40*	lb.	.50	- .51
G-50*	lb.	.40¾	- .41¼
G-53*	lb.	.45	- .46
G-60* (and G-61*)	lb.	.35	- .36
G-62*	lb.	.37	- .38
Parmo*	lb.	.06	- .13½
Petrolatum (dms.)	lb.	.04¼	- .14½
PG-16*	lb.	—	- .35
Philrich-5* (t.c.)	gal.	—	- .12½
Picco 10* (and 25*)	lb.	.15	- .15½
60* (and 75*)	lb.	.14½	- .15
100*	lb.	.14½	- .17
Piccocizer 30*	lb.	.05½	- .07
Piccolastic A* (B*, C*, D* & E*)	lb.	.24	- .25
FT* (FHX* & FX*)	lb.	.1695	- .1745
T-135*	lb.	.19	- .20
Piccolyte S Resins*	lb.	.20½	- .23½
Piccopale Resins*	lb.	.12	- .13
Piccoumaron Resins*	lb.	.07	- .24½
Pigmentar* Pigmentaroil*	lb.	.0460	- .0634
Plastac M*	lb.	—	- .09¼
Plasticizer 2286*	lb.	—	- .26¼
Plasticizer 4141*	lb.	.42½	- .43½
Plasticizer DP-200, DP-250, DP-520*	lb.	.45	- .45¼
DP-316*	lb.	.32¾	- .33½
DP-317*	lb.	.46	- .47¼
DP-8732*	lb.	.44¼	- .46
Plasticizer LP*	lb.	—	- .07
Plasticizer MP*	lb.	—	- .08
Plasticizer MT-511*	lb.	—	- .68¼
Plasticizer ODN*	lb.	.35	- .41
Plasticizer SC*	lb.	.40½	- .42
Plasticizer W-13*	lb.	.37	- .38¼
Plastoflex 3*	lb.	—	- .52
52*	lb.	.37¾	- .38¼
VS*	lb.	.41¾	- .42¼
Plastogen*	lb.	.08¾	- .09
Plastolein 9050* (c.l.)	lb.	.54½	- .56½
9055*	lb.	.30½	- .32½
9058*	lb.	.48	- .50
9250*	lb.	.38¼	- .40¼
9715*	lb.	.39	- .40
Plastone	lb.	.23	- .27
Polycizer 162*	lb.	.27½	- .28½
332*	lb.	.29	- .32½
562*	lb.	.28	- .29
662*	lb.	.28	- .29½
532 and 632*	lb.	.40	- .41¾
ED*	lb.	—	- .51
Polyco 438*	lb.	.34	- .35
Polymel C-130*	lb.	.13¼	- .14¼
D*	lb.	.22½	- .23½
6*	lb.	.05¾	- .07¼
Poly-Sperse AP-2	lb.	.23	- .29½
AP-300, LC-20	lb.	.26	- .32½
Poly-Sperse R-100	lb.	.17	- .23½
Process Oil C-255* (c.l.)	gal.	.27½	- .29½
Propylene Stearate (dms.)	lb.	—	- .32
PRR 1*	gal.	.15	- .35
PT 101 Pine Tar Oil* (t.c., dms.)	lb.	.0380	- .0554
400 Pine Tar* (600* & 800*) (t.c., dms.)	lb.	.0380	- .0554
PX-104*	lb.	.30	- .32½
PX-108*	lb.	.30½	- .33
PX-138*	lb.	.32½	- .33½
PX-208*	lb.	.44½	- .45½
PX-238*	lb.	.44½	- .45½
PX-404*	lb.	.66	- .67
PX-438*	lb.	.60	- .61
PX-800*	lb.	.34	- .35
PX-917*	lb.	.36½	- .37½
RC Plasticizer B-17* (dms.)	lb.	.23½	- .24½
O-16* (dms.)	lb.	.30	- .31
TG-8*&TG-9* (dms.)	lb.	.34½	- .35½
TG-85* (dms.)	lb.	.36½	- .37½
RC Polymeric BGA* (dms.)	lb.	.45½	- .46½
Reogen*	lb.	.14¼	- .14½
465 Resin* (dms.)	lb.	.07½	- .08
Resin C*	lb.	.0225	- .0310
Resinex*	lb.	.03¾	- .05½
L-4*	lb.	.02¼	- .03¾
Rexflex*	lb.	—	- .15
Rosin Oil	gal.	.80	- 1.35
RR-10 (Neoprene)*	lb.	—	- .37
R.S.O. Softening Oil*	lb.	.03	- .05
RuBars*	lb.	.19¼	- .20
Rubberol*	lb.	.18	- .25¾
Santicizer B-16*	lb.	.48¾	- .49¾
E-15*	lb.	.54	- .55
M-17*	lb.	.46	- .47
No. 140*	lb.	.35	- .36
No. 141*	lb.	.36	- .37
No. 160*	lb.	.29	- .30
No. 602*	lb.	—	- .28½
No. 603*	lb.	—	- .27
Sherolatum*	lb.	.03½	- .06
Staflex DBES*	lb.	.58	- .60½
DOS*	lb.	.58	- .60½
IXA*	lb.	.32	- .35
KA*	lb.	.36	- .38¾
Stan Chlor Oils*	lb.	.13½	- .20½
70*	lb.	.17½	- .30
Stanolind Petrolatum*	lb.	.07	- .156
Wax*	lb.	.31	- .33
Sunny South Burgundy Pitch*	lb.	.1030	- .1085
Rosin Oil*	gal.	.58	- .76
Superla Wax*	lb.	.30	- .397
Syncera Wax*	lb.	.16	- .267
Syn Tac* (c.l.)	gal.	—	- .33
Synthetic Revertant Oil	lb.	—	- .16

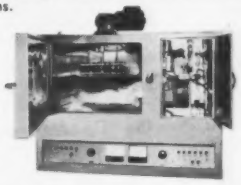
Reliable, Consistent Test Results With . . .

OREC 0300 *Automatically Controlled Ozone Test Chambers*

. . . certain factors associated with manual ozone measurement and control suggested the need for Automatically Controlled Ozone Test Chambers . . .



Orec 0300 Series employ an *electronic-chemical loop feed back servo system to achieve and precisely maintain chamber ozone concentrations.



Orec 0300 with Dynamic Stretching Apparatus.
* patent pending

OZONE:

- TEST CHAMBERS, 6 MODELS
- AUTOMATIC CONTROL SYSTEMS
- RECORDING INSTRUMENTATION
- STRETCHING APPARATUS
- MEASUREMENT INSTRUMENTATION
- GENERATORS
- TESTING SERVICE
- RESEARCH & DEVELOPMENT

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Ozone Research and Equipment Corporation

3840 North 40th Avenue **Phoenix, Arizona**

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Models 200 & 400

Gasket Splicer

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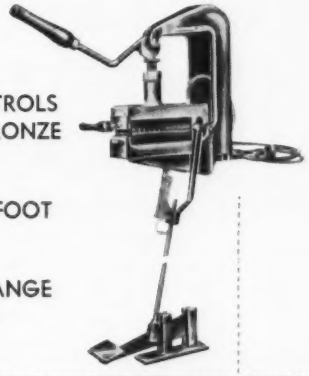
★ HAND OR FOOT OPERATED

★ QUICK CHANGE OF MOLDS



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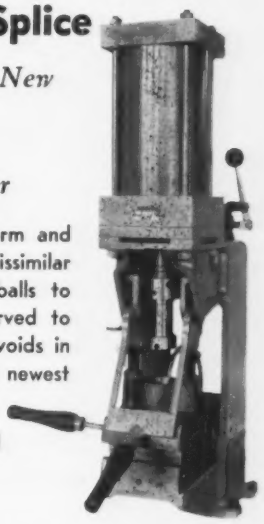

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SIVON MANUFACTURING CO.

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PLASTICIZERS & SOFTENERS (Cont'd)

Tar, Refined	gal.	.1200 -	.1760
Tarpine	lb.	.035 -	.050
Terpene A*	gal.	— -	.65
Tetraflex R-122*	lb.	.27 -	.30½
TP-90B*	lb.	.59 -	.6[illegible]
TP-95*	lb.	.65 -	.75
Transphalt Resins*	lb.	.03¾ -	.05½
Tributyl Phosphate	lb.	.52½ -	.53½
Tricresyl Phosphate	lb.	.32½ -	.36
Turgum S*	lb.	.10¾ -	.11¾
Turgum SB*	lb.	.07 -	.08
Turpol NC-1200*	lb.	.67 -	.70
NC-1300*	lb.	— -	.50
Vanadiset B*	lb.	.036 -	.07
C*	lb.	.031 -	.06
MR 80 Mesh*	lb.	.08½ -	.12½
Vistac No. 1*	gal.	1.00 -	1.21
P*	lb.	.18 -	.18½
Vopcolene 50*	lb.	— -	.31
Witcizer 100*	lb.	.26 -	.27
200*	lb.	.22¼ -	.25¼
300*	lb.	.30 -	.33½
312*, 313*	lb.	.28 -	.31½
412*	lb.	.42½ -	.46

PROCESSING AIDS

Castor Oil, Blown (dms.)	lb.	.26½ -	.27½
Refined (dms.)	lb.	— -	[illegible]
Castorwax*	lb.	.25 -	.31
Dutrex 7*	lb.	.12 -	.20
ELA*	lb.	— -	.84
Hydrofol Glycerides 200*	lb.	.15½ -	.19¾
Kenflex N*	lb.	.19 -	.26
Maleic Anhydride	lb.	— -	.27
Millrex*	lb.	— -	.15
Nadic Anhydride	lb.	— -	.75
Polycin*	lb.	— -	.24½
Resin No. 510*	lb.	.19 -	.26
No. 529*	lb.	.25 -	.32
Pulverized*	lb.	.20½ -	.25
Thiomalic Acid	lb.	— -	3.50
Zyrox*	lb.	.78 -	.88

PROTECTIVE & STABILIZING AGENTS

Acacia*	lb.	.12¾ -	.21
Alcogum*	lb.	.08½ -	.24
Alpha Protein	lb.	— -	.23
Arroostoocrat*	lb.	— -	.07½
Carob Bean Flour	lb.	— -	.50
Casein	lb.	.22 -	.35
Emcol K-8300* (dms.)	lb.	.14 -	.18
Ethylene Diamine 68%	lb.	.44 -	.47
Gum Arabic	lb.	— -	.23
Karaya Gum	lb.	— -	.35
Locust Bean Gum	lb.	— -	.50
Prosein*	lb.	— -	.06
Stablex B*	lb.	.50 -	.95
K*	lb.	.27 -	.35

RECLAIMING AGENTS

Amalgamator Z-4*	lb.	.34 -	.35
Armeen C*	lb.	.46 -	.52
Mixed Crude*	lb.	.19 -	.25
T*	lb.	.32 -	.38
Burco RA*	lb.	.05 -	.081
BWH-1*	gal.	.17 -	.18
C-6 Oil* (28* & 34*)	gal.	.33 -	.38
C-10 Oil*	gal.	.25 -	.30
C-33* (t.c.)	gal.	— -	.21½
C-42* (t.c.)	gal.	— -	.23
Caustic Soda—Flake 76% (c.l., dms.)	cwt.	— -	4.50
Liquid 50% (t.c.)	cwt.	— -	2.80
Solid 76% (c.l., dms.)	cwt.	— -	4.10
Cresylic Acid (99-100%)	gal.	.85 -	1.39
D-4* (t.c.)	gal.	— -	.27
E-5* (t.c.)	gal.	— -	.25
Flake Calcium Chloride (77-80%)	ton	— -	29.00
G.B. Reclaiming Oil*	gal.	.13½ -	.21½
CD-10*	gal.	.11½ -	.19½
CD-50-U*	gal.	.19½ -	.27½
Gensol No. 6* (t.c.)	gal.	— -	.42
Heavy Aromatic Naphtha	gal.	.13¼ -	.18½
LX-77 Reclaiming Solvent*	gal.	.21 -	.33
LX-572 Reclaiming Oil*	gal.	.27 -	.32
LX-777 Reclaiming Oil*	gal.	.23 -	.33
Neo-Fat D-242*	lb.	.05½ -	.07¾
42-70*	lb.	.08¼ -	.10¾
No. 517 H.B. Oil*	gal.	.11½ -	.16½
535*	gal.	.22 -	.27
Nucom* (t.c.)	gal.	— -	.42
Pitt-Consol "500" (dms.)	lb.	.30 -	.30½
PT 101 Pine Tar Oil* (t.c., dms.)	lb.	.0380 -	.0554
Q Oil* (t.c.)	gal.	— -	.286
Reclaiming Oil 3186-G*	gal.	.26 -	.33
Reclaiming Reagent No. 1431*	lb.	.21 -	.25
R.P.A. No. 3*	lb.	— -	.51
RR-10*	lb.	— -	.37
Soda Ash (c.l., bags)	cwt.	— -	1.75
Solvent 534*	gal.	.20½ -	.26½
Solvent Oil 21*	gal.	.24 -	.29
C-42*	gal.	.23 -	.38
X-1 Resinous Oil*	lb.	.0225 -	.0325
701 Oil*	gal.	.27 -	.29

REINFORCING AGENTS—CARBON BLACK

Channel, Hard Processing (HPC) (bags)

Atlantic HPC-98*	lb.	.0775 -	.1550
Croflex*	lb.	.0775 -	.1550
Dixiedensed (and S)*	lb.	.0775 -	.1550
Kosmobile (and S)*	lb.	.0775 -	.1550
Micronex HPC*	lb.	.0775 -	.1550

Channel, Medium Processing (MPC) (bags)

Arrow MPC*	lb.	.0775 -	.1550
Atlantic MPC-95*	lb.	.0775 -	.1550
Continental A*	lb.	.0775 -	.1550
Croflex TH*	lb.	.0775 -	.1550
Dixiedensed HR (and S-66)	lb.	.0775 -	.1550
Kosmobile HM (and S-66)	lb.	.0775 -	.1550
Micronex Standard*	lb.	.0775 -	.1550
Spheron 6*	lb.	.0775 -	.1550
Texas M*	lb.	.0775 -	.1450
Witco No. 1*	lb.	.0775 -	.1550

Channel, Easy Processing (EPC) (bags)

Atlantic EPC E-42*	lb.	.0775 -	.1550
Collocarb*	lb.	.0590 -	.1400
Continental AA*	lb.	.0775 -	.1550
Croflex 77*	lb.	.0775 -	.1550
Dixiedensed 77*	lb.	.0775 -	.1550
Kosmobile 77*	lb.	.0775 -	.1550
Micronex W-6*	lb.	.0775 -	.1550
Spheron 9*	lb.	.0775 -	.1550
Texas E*	lb.	.0775 -	.1450
Witco No. 12*	lb.	.0775 -	.1550
Wyex EPC*	lb.	.0775 -	.1550

Channel, Conductive (CC) (bags)

Continental R-40*	lb.	.2600 -	.3500
Dixie 5 Dustless*	lb.	.1350 -	.2200
Dixie Voltex*	lb.	.2600 -	.3500
Kosmink Dustless*	lb.	.1350 -	.2200
Kosmos Voltex*	lb.	.2600 -	35.00
Spheron C*	lb.	.1800 -	.2400
Voltex*	lb.	.2600 -	.3500

Conductive Furnace Black (CF) (bags)

Aromex CF*	lb.	.0875 -	.1550
Atlantic CF*	lb.	.0925 -	.1600
Continex CF*	lb.	.1100 -	.1700
Croflex CF*	lb.	.0925 -	.1600
Dixie CF*	lb.	.0925 -	.1600
Kosmos CF*	lb.	.0925 -	.1600
Shawinigan Acetylene Black*	lb.	— -	.1900
Vulcan C*	lb.	.1100 -	.1850

Extra Conductive Furnace Black (ECF) (bags)

Vulcan XC-72 (pellets)*	lb.	.2500 -	.3400

Furnace, Fast Extruding (FEF) (bags)

Arovel FEF*	lb.	.0675 -	.1350
Atlantic 125*	lb.	.0675 -	.1350
Continex FEF*	lb.	.0675 -	.1350
Croflex 50*	lb.	.0675 -	.1350
Dixie 50*	lb.	.0675 -	.1350
Kosmos 50*	lb.	.0675 -	.1350
Philblack A*	lb.	.0675 -	.1350
Statex M*	lb.	.0675 -	.1350
Sterling SO*	lb.	.0675 -	.1350

Furnace, Fine (FF) (bags)

Statex B*	lb.	.0725 -	.1400
Sterling 99*	lb.	.0725 -	.1400

Furnace, General Purpose (GPF) (bags)

Arogen GPF*	lb.	.0600 -	.1275
Atlantic 118*	lb.	.0600 -	.1275
Continex GPF*	lb.	.0600 -	.1275
Croflex 35*	lb.	.0600 -	.1275
Dixie 35*	lb.	.0600 -	.1275
Kosmos 35*	lb.	.0600 -	.1275
Statex G*	lb.	.0600 -	.1275
Sterling V*	lb.	.0600 -	.1275
V (Non-Staining)	lb.	.0600 -	.1275

Furnace, High Abrasion (HAF) (bags)

Aromex HAF*	lb.	.0775 -	.1450
Atlantic 130*	lb.	.0775 -	.1450
Continex HAF*	lb.	.0775 -	.1450
Croflex 60*	lb.	.0775 -	.1450
Dixie 60*	lb.	.0775 -	.1450
Kosmos 60*	lb.	.0775 -	.1450
Philblack O*	lb.	.0775 -	.1450
Statex R*	lb.	.0775 -	.1450
Vulcan 3*	lb.	.0775 -	.1450

REINFORCING AGENTS—CARBON BLACK (Cont'd)

Furnace, High Modulus (HMF) (bags)

Atlantic 120*	lb.	.0625 -	.1300
Continex HMF*	lb.	.0675 -	.1300
Croflex 40*	lb.	.0625 -	.1300
Dixie 40*	lb.	.0625 -	.1300
Kosmos 40*	lb.	.0625 -	.1300
Modulex HMF*	lb.	.0625 -	.1300
Statex 93*	lb.	.0625 -	.1300
Sterling L*	lb.	.0625 -	.1300
LL*	lb.	.0625 -	.1300

Furnace, Semi-Reinforcing (SRF) (bags)

Atlantic 115*	lb.	.0575 -	.1250
Continex SRF*	lb.	.0575 -	.1250
Croflex 20*	lb.	.0575 -	.1250
Dixie 20*	lb.	.0575 -	.1250
Essex SRF*	lb.	.0575 -	.1250
Furnex*	lb.	.0575 -	.1250
Gastex*	lb.	.0625 -	.1350
Kosmos 20*	lb.	.0575 -	.1250
Pelletex*	lb.	.0575 -	.1250
NS*	lb.	.0575 -	.1250
Shawinigan Acetylene Black*	lb.	— -	.1900
Sterling NS*	lb.	.0575 -	.1250
R*	lb.	.0625 -	.1350
S*	lb.	.0575 -	.1250

Furnace Super Abrasion (SAF) (bags)

Atlantic 150*	lb.	.1150 -	.1750
Croflex 85*	lb.	.1150 -	.1750
Dixie 85	lb.	.1150 -	.1750
Kosmos 85	lb.	.1150 -	.1750
Philblack E*	lb.	.1150 -	.1900
Statex 160*	lb.	.1150 -	.1900
Vulcan 9*	lb.	.1150 -	.1900

Furnace, Super Abrasion, Intermediate (ISAF) (bags)

Aromex ISAF*	lb.	.0925 -	.1600
Atlantic 135*	lb.	.0925 -	.1600
Continex ISAF*	lb.	.0925 -	.1600
Croflex 70*	lb.	.0925 -	.1600
Dixie 70*	lb.	.0925 -	.1600
Kosmos 70*	lb.	.0925 -	.1600
Philblack I*	lb.	.0925 -	.1600
Statex 125*	lb.	.0925 -	.1600
Vulcan 6*	lb.	.0925 -	.1600

Furnace, Super Conductive (SCF) (bags)

Conductex SC*	lb.	.1150 -	.1800
Vulcan SC*	lb.	.1800 -	.2550

Thermal, Fine (FT) (bags)

P-33 (c.l.)*	lb.	— -	.0575
Sterling FT (c.l.)*	lb.	— -	.0575

Thermal, Medium (MT) (bags)

Shellblack*(†)	lb.	— -	.0250
Sterling MT (c.l.)*	lb.	— -	.0400
MT Non-Staining (c.l.)*	lb.	— -	.0500
Thermax (c.l.)*	lb.	— -	.0400
Stainless (c.l.)	lb.	—	.0500

REINFORCING AGENTS—SILICA

Cab-o-sil*	lb.	.66 -	1.25
D. C. Silica (pelletized)*	lb.	1.45 -	1.65
Hi-Sil 233*	lb.	.08¼ -	.09¾
X303*	lb.	.40 -	.45
Santocel*	lb.	.62 -	.64
Valron Estersil*	lb.	2.00 -	2.25

REINFORCING AGENTS—MISCELLANEOUS

Angelo Shellac*	lb.	.40 -	.50
Cato* (bags)	lb.	17.00 -	17.15
Darex Copolymer No. 3*	lb.	.47 -	.49
43G*	lb.	.39 -	.41
Darex Copolymer Latex No. 3-L	lb.	.41½ -	.46
Durez 12687 (and 12707)*	lb.	.36½ -	.40
Durez 13355*	lb.	.27½ -	.31½
Good-rite Resin 2097*	lb.	.36 -	.38
2057*	lb.	.30 -	.31
Hystron*	lb.	.39 -	.41
Kralac A-EP*	lb.	.39 -	.41
Lampblack	lb.	— -	.12
Marbon S and S-1*	lb.	.36 -	.43
8000*	lb.	.36 -	.43
Marmix	lb.	.35 -	.43
Mistron Vapor*	ton	— -	70.00
HGO-55*	ton	— -	95.50
Pliolite Latex 150*	lb.	.35 -	.39
Pliolite Resin-Rubber Masterbatches*	lb.	.33 -	.57
Pliolite NR*	lb.	.93 -	.95
S6B*	lb.	.36 -	.43
Plio-Tuf G85C*	lb.	.52 -	.54
Polyco 220*	lb.	.18¼ -	.19¼
Polypol S-70*	lb.	.25 -	.26

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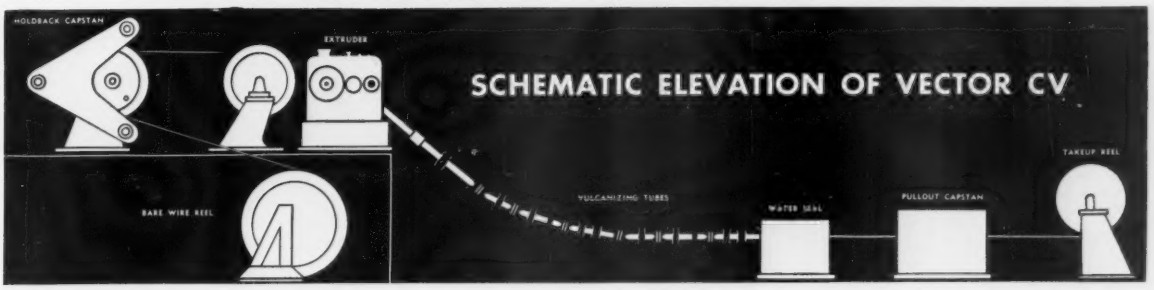

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VECTOR CV with special new double seal combines the advantages of horizontal and vertical CV without the disadvantages of either. Check these important features:

- **QUALITY**—wire and cable is completely supported externally to prevent scuffing and distortion.
- **SPEED**—full cycle of vulcanizing and pressure cooling assures production speeds commonly associated with horizontal CV.
- **VERSATILITY**—Positive support and full length of vulcanizing tubes assures economical production of a wide range of cable.
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- **COMPLETE** electrical control.

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RETARDERS

Benzoic Acid TBAO-2*	lb.	——	.44
Dutch Boy Normasal*	lb.	——	.46
ESEN*	lb.	.35	.37
Good-rite Vultrol*	lb.	.67	.70
Harcopol 1183*	lb.	.70	.74
Retarder J*	lb.	.62	.64
PD*	lb.	.39	.41
W*	lb.	——	.46
Retardex*	lb.	.46	.46
Wiltrol I*	lb.	.39	.41

RUBBER SUBSTITUTES

Mineral Rubber

Byerlyte*	ton	50.00	- 57.00
Hard Hydrocarbon (dms.)*	ton	53.00	- 60.00
Herron Flake*	ton	——	- 45.00
Mineral Rubber, Solid	ton	42.50	- 44.50
M. R. No. 38*	ton	57.00	- 70.00

Vulcanized Vegetable Oils

Amberex*	lb.	.29	- .46
Brown	lb.	.15	- .24
Car-Bel-Lite*	lb.	——	- .36
Neophax*	lb.	.17	- .27
Polyrez A and C*	lb.	.12	- .17
White	lb.	.15	- .26
670 Brown	lb.	.14¼	- .14¾

Miscellaneous Rubber Substitutes

G.B. Asphaltenes*	lb.	.06	- .06½
Gilsowax B*	lb.	.09	- .11
Resin No. 1098 (dms.)	lb.	——	- .62
No. 1198*	lb.	.46¾	- .49¾
Tysonite*	lb.	.26	- .26¼

SOLVENTS

Acetone (dlvd.)	lb.	.11	- .12½
Amsco Lactol Spirits* (t.c.)	gal.	——	- .20
Naphthol Spirits*	gal.	——	- .19
Mineral Sprits*	gal.	——	- .18
Rubber Solvent* (t.c.)	gal.	——	- .19
Solv A* (t.c.)	gal.	——	- .22
Solv A-80* (t.c.)	gal.	——	- .23½
Solv B* (t.c)	gal.	——	- .28
Solv B-90* (t.c.)	gal.	——	- .31
Solv D* (t.c.)	gal.	——	- .30
Solv E*	gal.	——	- .30
Solv F*	gal.	——	- .30
Solv F-80*	gal.	——	- .32
Solv G*	gal.	——	- .36
Special Naphtholite* (t.c.)	gal.	——	- .19
Special Textile Spirits*	gal.	——	- .20
Super Hi-Flash Naphtha*	gal.	——	- .34
Super Naphtholite*	gal.	——	- .19
Textile Spirits* (t.c.)	gal.	——	- .20
Amyl Chlorides, Mixed (t.c.l.) (dms.)	lb.	——	- .11
Benzol 90%	gal.	.36	- .40
Butyl Acetate	lb.	.17	- .18
Butyl Alcohol	lb.	.17	- .18
Secondary (dlvd.)	lb.	.15	- .16½
Tertiary (dlvd.)	lb.	.15	- .16½
Carbon Bisulfide, Tech.	lb.	.0545	- .0161
Carbon Tetrachloride	lb.	.10¾	- .14¾
Cosol 1*	gal.	.37	- .43
2*	gal.	.42	- .48
Cyclohexane	gal.	.77	-110.00
85% (c.l.) (dms.)	gal.	——	- .36
Cyclohexanone	lb.	.29	- .31½
Diacetone, Pure (dlvd.)	lb.	.15½	- .17
Dichlorethyl Ether (dms.)	lb.	.15½	- .16½
Dichloropentanes (t.c.l.) (dms.)	lb.	——	- .06
Dicom*	gal.	——	- .55
Halowax Oil*	lb.	.28	- .41
Heptanes* (t.c.)	gal.	.19	- .22
Hexanes (t.c.)	gal.	.19	- .22
Isopropyl Alcohol, Ref. 99% (dlvd.)	gal.	.62	- .72
Ether, Ref. (dlvd.)	lb.	.09½	- .11
Mersol*	gal.	.43	- .79
Mesityl Oxide (dlvd.)	lb.	.15	- .16½
Methyl Acetone, Syn. (dms., dlvd.)	gal.	.66	- .72
Methyl Chloride	lb.	——	- .12¾
Methyl Ethyl Ketone	lb.	.15	- .16½
Methyl Isobutyl Ketone (dlvd.)	lb.	.17	- .18½
Methylene Chloride	lb.	——	- .12½
N-5 Pentane Mix* (t.c.)	gal.	——	- .13½
N-6 Hexanes* (t.c.)	gal.	——	- .14½
N-7 Hexanes* (t.c.)	gal.	——	- .13½
Penetrell*	gal.	.42	- .63
Perchlorethylene	lb.	——	- .11
Petrolene* (t.c.)	gal.	——	- .14125
Picolines, Alpha, Refined	lb.	.43½	- .44
Mixed	lb.	.32½	- .33
Proprietary Solvent (dms.)	gal.	.66	- .77
Propyl Acetate (t.c., dlvd.)	lb	——	- .11¾
Alcohol (t.c., dlvd.)	lb.	——	- .11
Pyridine, Refined	lb.	.74½	- .75
Quinoline	lb.	.50	- .54¼
Rubber Solvent (t.c.)	gal.	——	- .16
Rubsol (t.c.)	gal.	——	- .12875
Skellysolve B (Hexanes)* (t.c.)	gal.	——	- .158
C (Heptanes)* (t.c.)	gal.	——	- .151
R (Rubber Solvent)*	gal.	——	- 1.29
Solvent, Crude, Light	gal.	.19	- .28

SOLVENTS (Cont'd)

Solvesso 100* (t.c.)	gal.	.33	- .35
150 (t.c.)	gal.	.33	- ——
Sunny South DD Dipentine*	gal.	.42	- .63
Sunny South DD Pine Oil*	lb.	——	- .15
Sunray*	gal.	.1140	- .1600
Toluene (dms.)	gal.	——	- .38
Toluol (t.c.)	gal.	.33	- .35
Trichlorethane	lb.	——	- .12¾
Triglycol Dichloride	lb.	.63	- .64
Union Thinner 1* (t.c.)	gal.	——	- .174
5* (dms.)	gal.	——	- .199
7* (t.c.)	gal.	——	- .164
2-50 W Hi-Flash*	gal.	——	- .41
Xylol	gal.	.34	- .38

STABILIZING AGENTS (for Vinyl Resins)

Advastab BC-12*	lb.	.90	- .95
BC-74*	lb.	.70	- .75
BC-105*	lb.	.75	- .80
CH-101*	lb.	.60	- .65
CH-201*	lb.	.60	- .65
E-82*	lb.	90	- .95
JCX*	lb.	.62	- .67
L Paste*	lb.	.65	- .70
SN*	lb.	.47	- .52
T-10*	lb.	1.90	- 1.95
T-50-LT*	lb.	3.20	- 3.25
XBZ-155*	lb.	.69	- .74
XC-143*	lb.	.90	- .95
XE-98*	lb.	.53	- .58
Amioca 50* 85* (bags)	lb.	11.11	- 11.26
Barca 10*	lb.	.75	- .80
Barium Ricinoleate (BVS)	lb.	——	- .70
Barium Stearate	lb.	.41	- .46
Basic Silicate White Lead	lb.	.16	- .17
Cadmium Ricinoleate	lb.	——	- 2.00
Calcium Ricinoleate	lb.	——	- .55
Dutch Boy DS-207*	lb.	——	- .54
Plumb-O-Sil A*	lb.	——	- .29¾
B*	lb.	——	- .31¼
Tribase*	lb.	——	- .26½
Dythal*	lb.	——	- .39½
Ferro 182* (dms.)	lb.	.70	- .76
200* (dms.)	lb.	1.33	- 1.43
203* (dms.)	lb.	.87	- .91
541* (dms.)	lb.	.35½	- .45½
541A* (dms.)	lb.	.82	- .86
700* (dms.)	lb.	.48¾	- .58¾
900* (dms.)	lb.	.90	- .94
903* (dms.)	lb.	.60	- .64
909* (dms.)	lb.	.91	- .95
920*	lb.	——	- .98
931* (dms.)	lb.	.75¾	- .85¾
993* (dms.)	lb.	.89	- .99
1203* (dms.)	lb.	1.30	- 1.40
1206* (dms.)	lb.	1.32	- 1.36
1820* (dms.)	lb.	.90	- .94
1825* (dms.)	lb.	1.00	- 1.04
1976*	lb.	.47	- .51
Harshaw 1-V-3*	lb.	.43	- .45
1-V-4*	lb.	.66½	- .70
1-V-7*	lb.	.70	- .72
2-V-4*	lb.	.85	- .87
2-V-7*	lb.	——	- 1.10
2-V-8*	lb.	——	- 1.30
5-V-1*	lb.	.41	- .43
7-V-1*	lb.	——	- .90
8-V-1*	lb.	.88	- .90
8-V-5*	lb.	——	- .80
8-V-100*	lb.	.82	- .84
9-V-1*	lb.	.70	- .72
12-V-5*	lb.	73	- .75
24-V-1*	lb.	1.10	- 1.12
28-V-2*	lb.	——	- 1.18
128 V-5*	lb.	.86	- 88
Kosol* (bags)	lb.	19.00	- 19.50
Lithium Stearate	lb.	.52	- .57
Fluffy	lb.	.47½	- .70
Standard	lb.	.52½	- .75
Mark A*	lb.	2.80	- 3.15
C*	lb.	.81	- .84
E*	lb.	.72	- .75
GS*	lb.	.77	- .80
M*	lb.	.59	- .62
PL*	lb.	.62	- .65
TT*	lb.	.72	- .75
WS*	lb.	.97	- 1.00
X*	lb.	2.50	- 2.75
XI*	lb.	.87	- .90
XV*	lb.	.84	- .87
XX*	lb.	.57	- .60
Metasap 613-A*	lb.	——	- .69
613-B*	lb.	——	- .84
613-C*	lb.	——	- 1.06
621*	lb.	——	- .88
624*	lb.	——	- .75
633*	lb.	——	- .75
635*	lb.	——	- .45
Modicol N*	lb.	.42½	- .44½
S*	lb.	.30½	- .32½
Sodium Silicates 41°/1:32	cwt.	1.20	- 2.30
Stabelan E*	lb.	1.40	- 1.50
XL*	lb.	.55	- .65
HR 50*	lb.	.75	- .90
HR Liquid*	lb.	.65	- .75
HR Paste*	lb.	.85	- .95
HR Powder*	lb.	.95	- 1.05

STABILIZING AGENTS (Cont'd)

No. 110 Liquid	lb.	.63	- .75
Istabelan No. 115 Liquid	lb.	.85	- .95
No. 120 Liquid	lb.	.65	- .75
Stabilizer No. 52*	lb.	1.90	- 2.00
89X*	lb.	.75	- .80
B-5*	lb.	——	- .70
E6B*	lb.	——	- .95
G-1*	lb.	1.25	- 1.40
HR*	lb.	.85	- .89
L*	lb.	——	- .60
OM-10*	lb.	——	- 1.95
Staflex OY*	lb.	1.00	- 1.20
QXMA*	lb.	——	- .70
Stayrite 10*	lb.	.36	- .41
P-10*	lb.	.43	- .45
15*	lb.	.55	- .57
20*	lb.	.41	- .46
22*	lb.	1.00	- 1.13
25*	lb.	.35	- .40
70*	lb.	.70	- .72
71*	lb.	.90	- .92
75*	lb.	.61	- .63
76*	lb.	.53	- .55
80*	lb.	.70	- .72
90*	lb.	.70	- .72
95*	lb.	.70	- .72
229*	lb.	.61	- .63
Vanstay A* (dms.)	lb.	.50	- .53
AB* (dms.)	lb.	.46	- .49
CE* (dms.)	lb.	.44	- .47
HT* (dms.)	lb.	.87	- .90
HTA* (dms.)	lb.	.97	- 1.00
HTB* (dms.)	lb.	.70	- .73
HTC* (dms.)	lb.	1.09	- 1.12
L* (dms.)	lb.	.32	- .35
R* (dms.)	lb.	.67	- .70
RZ-25* (dms.)	lb.	.65	- .69
S* (dms.)	lb.	.57	- .60
SA* (dms.)	lb.	.81	- .84
W* (dms.)	lb.	1.22	- 1.25
X* (dms.)	lb.	.67	- .70
Z* (dms.)	lb.	.62	- .65

STIFFENING AGENTS

Polyac*	lb.	——	- 1.85
Processing Stiffener 710*	lb.	——	- .88
Solvitose HDF, H. C-S, T, and E*	lb.	.22	- .25
Versatil Gum 8-E*	lb.	.15	- .19

SUN CHECKING AGENTS

Allied AA-1144*	lb.	.23	- .24
AA-1177*	lb.	.15½	- .16½
Antisol*	lb.	——	- .23
Antisun* (Chipped)	lb.	.15½	- .17½
(Slabbed)	lb.	.15	- .17
Heliozone*	lb.	.31	- .32
Microflake*	lb.	.20	- .24
Nacconol NRSF*	lb.	.40½	- .45
NBC*	lb.	——	- 1.67
Ross Sunproofing Waxes*	lb	——	- .15
Sunolite*	lb.	.16	- .22
127*	lb.	.16½	- .20½
154*	lb.	.23	- .25
Sunproof*	lb.	.31	- .32
713*	lb.	.25	- .26
Improved*	lb.	.25	- .26
Super*	lb.	.40	- .41
Jr*	lb.	.20	- .21
Tonox*	lb.	.52	- .54

SURFACE ACTIVE AGENTS

Anhydrapent*	lb.	.56	- .59
Anhydrol 6990*	lb.	.51	- .56
6991*	lb.	.51	- .56
Aquarex D*	lb.	——	- .78
G*	lb.	——	- .21
MDL*	lb.	——	- .33
ME*	lb.	——	- .80
NS*	lb.	——	- .60
SMO*	lb.	——	- .50
WAQ*	lb.	——	- .20
Emulphor EL-620*	lb.	——	- .40
EL-719*	lb.	——	- .58
ON-870*	lb.	——	- .55
Hyonics*	lb.	——	- .28¾
Igepal CA-630	lb.	——	- .29
CO-630	lb.	——	- .29
CO-730	lb.	——	- .29
CO-850*	lb.	——	- .29
CO-880*	lb.	——	- .29
Igepon CN-42*	lb.	——	- .25
T-33*	lb.	——	- .21
T-51*	lb.	——	- .13½
T-77*	lb.	——	- .49
Kessco 50201*	lb.	——	- .44½
50203*	lb.	——	- .44¼
18201*	lb.	——	- .32
18203*	lb.	——	- .35½
Lipal 9-N.* 11-0*	lb.	.28	- .29
8-0,* 6-0*	lb.	.29	- .30
25C,* 52C*	lb.	.34	- .35
15T*	lb.	.23	- .24
Pluronic L62*	lb.	.33½	- .39
L64*	lb.	.33½	- .39
Sellogen Gel*	lb.	——	- .12¾
Soybean Lecithin	lb.	.13	- .17
Synatol AV-60*	lb.	.28	- .29

TACKIFIERS

Amalgamator Z-4*	lb.	.34	- .35
Arcco 620-32B*	lb.	.20½	- .21½
716-30*	lb.	.18½	- .19½
1041-21*	lb.	.16½	- .17½

TACKIFIERS (Cont'd)

Arcco A-24*	lb.	.18	.19
Bunaweld Polymer No. 780*	lb.	—	.24
No. 5514*	lb.	—	.35
Galex* (dms.)	lb.	.16	.18¾
Indopol H-300*	gal.	1.00	1.22
Koresin*	lb.	—	.95
Liquid Rubber Flux*	lb.	—	.14
Nacconal NRSF* (dlvd.)	lb.	.40½	.45
Nilox Resin* (c.l.)	cwt.	—	16.00
PR-162 Resin Emulsion	lb.	.82	—
Resin V	lb.	—	.23½
Synthol*	lb.	.17	.24¾
Vistac A*	lb.	.21½	.22¼
Vistanex LM Grades*	lb.	—	.45
Zirex* (c.l.)	cwt.	—	15.25

THICKENERS (For Latex)

Alcogum AN-6*	lb.	.06	.06½
AN-10*	lb.	.09	.10
AN-25*	lb.	—	.31
PA-15*	lb.	—	.16
Betanol* (dms.)	lb.	.70	.95
CM Starch* (bags)	lb.	26.85	27.00
Gomme Labolene*	lb.	.45	.47
Good-rite K-702*	lb.	.28½	.37
K-704*	lb.	.21	.22
K-705*	lb.	.30	.39
K-707*	lb.	.18	.19
K-708*	lb.	.28	.37
K-710*	lb.	.15	.16
Hycryl A-1000* (t.l.)	lb.	.090	.100
A-2000* (t.l.)	lb.	.335	.360
Hydroseal 3* (bags)	lb.	9.19	9.34
Melojel* (bags)	lb.	6.71	6.86
Modicol VD*	lb.	.13¾	.14¼
VE*	lb.	.13¾	.14¼
Polyco 296 BT*	lb.	.15	.16
296-N*; 530*	lb.	.15	.16
Propylene Laurate (dms.)	lb.	.57	.82
Sodium Silicate, 41°/1:3.2	cwt.	1.20	2.30
Solvitose Series*	lb.	.22	.25

VULCANIZING AGENTS

Peroxide

Di-cup	lb.	1.10	....
UC XK-1960*	lb.	5.50	—

Selenium

Vandex*	lb.	—	7.00
VA-7*	lb.	—	.50

Sulfur

Blackbird* (c.l.)	cwt.	—	2.85
Cloud* (c.l.)	cwt.	—	2.80
Crystex*	lb.	.19½	.23
Darex Dispersed Sulfur*	lb.	.14	.16

VULCANIZING AGENTS (Cont'd)

Devil A* (c.l.)	cwt.	—	2.40
Dispersed Sulfur	lb.	.14	.16
Insoluble Sulfur 60*	lb.	.12½	.13
Ko-Blend IS*	lb.	—	.39
Mist* (Wettable) (c.l.)	cwt.	—	4.00
Spider* (c.l.)	cwt.	—	2.80
Star* (c.l.)	cwt.	—	3.25
Sulfasan R*	lb.	1.55	1.57
Tire* (c.l.)	cwt.	—	2.55
Tube* (c.l.)	cwt.	—	4.40
Vultac 2*	lb.	.47	.49
3*	lb.	.51	.53

Tellurium

Telloy*	lb.	—	2.65

WETTING AGENTS

Advawet No. 10*	lb.	—	.17
No. 33*	lb.	—	.44
Aerosol 18*	lb.	.37	.42
AY*	lb.	.75	.80
MA 80%*	lb.	.40	.45
OT 75% Aqueous*	lb.	.40	.45
OT 100%*	lb.	.75	.80
OT-B*	lb.	.65	.70
Alrosol* (dms.)	lb.	.35	.41
Alrosperse*	lb.	—	.18
Anhydrol 6990* and 6991*	lb.	.51	.56
Areskap 50*	lb.	.30	.32
Dry 100*	lb.	.60	.64
Aresket Dry 300*	lb.	.60	.64
Aresklene 375*	lb.	.42	.47
Armacs*	lb.	.28	.77
Arquads*	lb.	.42	.61
Emcol 5100* (dms.)	lb.	—	.31
Energetic W-100	lb.	.28½	.35
Etho-Chemicals*	lb.	.26	.58
Ethomeen S/15*	lb.	.48	.50
T/15*	lb.	.46	.49
Kessco E-122* (dms.)	lb.	—	.45
18201*	lb.	—	.32
Kreelon 4D* (dms.)	lb.	.13	.16
8G (dms.)	lb.	.26	.28
Kyro EO* (dms.)	lb.	—	.29¼
Modicol N*	lb.	.42½	.44½
S*	lb.	.30⅞	.32⅞
Nacconol SL* (dlvd.)	lb.	.084	.10
60S* (dlvd.)	lb.	19	.225
Nacconol A* (dlvd.)	lb.	—	.52
Nekal WS-25	lb.	—	.38
WS-99	lb.	—	.95
Orvus AB Granules*	lb.	.16¼	.17¾
Parnol*	lb.	—	.13½
Regal Beads	lb.	.12¾	.16¾
H. D. Beads	lb.	.12¾	.15¾
Santomerse No. 3	lb.	.41	.45
S*	lb.	1.55	....

WETTING AGENTS (Cont'd)

Sorapon SF-73*	lb.	—	.18
SF-78*	lb.	—	.30
Sorbit P*	lb.	—	.28
Soybean Lecithin	lb.	.13	.17
Stablex G*	lb.	.50	.90
Tergitol 4* (dms., dlvd.)	lb.	.36½	.37½
7* (dms., dlvd.)	lb.	.43½	.44½
O8* (dms., dlvd.)	lb.	.36½	.37½
P28* (dms., dlvd.)	lb.	.18½	.19
Trenamine W-30	lb.	—	.15
Vultamol*	lb.	—	.17¾
Wetsit Conc.*	lb.	.35	.35

MISCELLANEOUS CHEMICALS

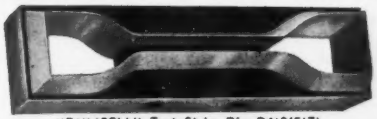
Aquesperse 30*	lb.	—	.11
Arccopel W-18*	lb.	.17	.19
Black-Out Black, Clear & White	gal.	4.50	8.00
Chiplac Plaint	gal.	1.15	5.00
Copper Inhibitor No. 65*	lb.	—	1.57
D-Tac*	lb.	—	.22
2-Ethyl Hexanol	lb.	.23¼	.24¼
Fura-Tone Resin 1226*	lb.	.41	.43
MODX*	lb.	.38	.40
Nacconates* (dms.)	lb.	.99	3.53
Para Resins*	lb.	.04	.04½
Pigmented Filmite* (dlvd.)	lb.	.16¼	—
Resorcin, Tech.	lb.	.77½	.81½
Rio Resin*	lb.	.70	.72
Rongalite CX*	lb.	—	.21½
Sherosopes*	lb.	.13½	.18¾
Sublac Resin PX-5*	lb.	.23½	.24½
Synpep*	lb.	.54	.60
Thiokol LP-205*	lb.	—	4.00
Tysonite*	lb.	.30	.30¾
Vanfre*	gal.	2.45	3.00
No. 3* & No. 4*	gal.	1.95	2.00

SUPPLIERS

Are Your Materials Listed in the Market Prices Section? Forward full Information to Market Editor

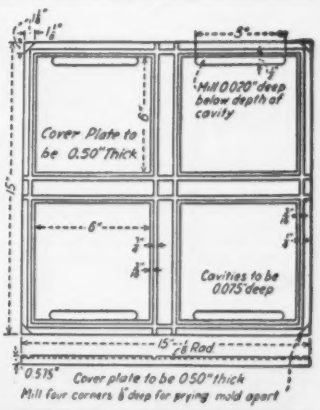
HOGGSON TOOLS, MOLDS, DIES

For Rubber Testing and Production



"DUMBELL" Test Strip Die D412(51T)

For making tensile test samples, we make many types of slab molds. One is detailed at the right. These are plain or chrome finished. We usually stock molds for making adhesion, abrasion, flexing, compression and rebound test samples, but supply special molds promptly. We also furnish hand-forged tensile dies for cutting regular or tear test samples.



SLAB MOLD D15-55

HOGGSON & PETTIS MFG. CO., 141A Brewery St., New Haven 7, Conn.

Pac. Coast: H. M. Royal, Inc., Downey, Calif.

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BETTER CUTTING SURFACES
Ideal for Susan and other Grinders
PROVIDE GREATER EFFICIENCY!

For Information and Prices Write To:

B-B MACHINERY INDUSTRIES, INC.

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ALL STEEL, ALL WELDED CONSTRUCTION, with forged steel hubs for 1¼", 1½" and 2" square bars. 4", 5", 6" 8", 10", 12", 15", 20" and 24" diameters. Any length.

Also Special Trucks, Racks, Tables and Jigs, Used in manufacturing rubber and plastic products.

THE W. F. GAMMETER COMPANY
CANTON, OHIO

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25c per word in bold face type—Minimum, $7.50
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When Box Number is used, add 5 words to word count

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Replies to keyed advertisements will be forwarded to advertiser without charge.

Address all replies to Box Numbers care of RUBBER AGE, 101 West 31st St., New York 1, N. Y.

Copy for September, 1959, issue must be received by Tuesday, August 25

POSITIONS WANTED

GRADUATE INDUSTRIAL ENGINEER with ten years heavy factory experience in all phases of quality control, production plant management and industrial engineering related to the manufacture of tires, retreading materials, shoe soling and all types of rubber coated fabrics desires executive position, line or staff, with a progressive expanding organization. Address Box R-420-P, RUBBER AGE.

PLANT MANAGER—Must relocate and willing to locate anywhere. 20 years of solid and diversified experience. Aggressive, and have record for delivering top results. Product experience covers all types mechanicals—both solid and sponge, extrusions, latex dipped, foam products, sundries, novelties, and urethane coatings. Successful administrator. Have excellent record in labor relations, cost and production controls, product and tool design, sales, and compounding. Seek connection with progressive and modern thinking, medium-sized company. Address Box R-430-P, RUBBER AGE.

LATEX, NATURAL RUBBER—with 4 years lab and production experience in adhesives, coatings, rug backings and foam. Young family man with college training desires position with advancement potential. Address Box R-429-P, RUBBER AGE.

HELP WANTED

RUBBER CHEMIST—Chemical engineer with experience in rubber compounding necessary. Progressive industrial rubber plant located in Pennsylvania. Excellent opportunity. Company paid benefits. Submit complete resumé including references and salary requirements. All replies confidential. Address Box R-421-W, RUBBER AGE.

RUBBER CHEMIST—Experience preferably in conveyor belting—knowledge of solvent and latex cements helpful. Age about 28-32. Eastern location in pleasant surroundings, pension and good fringe benefits. Send resumé, including salary requirements and marital status. Address Box R-427-W, RUBBER AGE.

RUBBER CHEMISTS

Experienced rubber chemists to take charge of compounding, development and research groups on rubber heels, soles, open and closed cell sponge and mechanicals. These openings offer tremendous growth opportunities for the right men. Address Box R-425-W, RUBBER AGE.

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Graduate Chemical Engineer. Product development work plastics and elastomers—similar experience desirable but not necessary. Send resumé and salary desired: E. L. Bixby, GOODALL RUBBER CO., Trenton 4, N. J.

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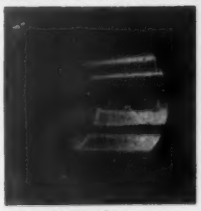

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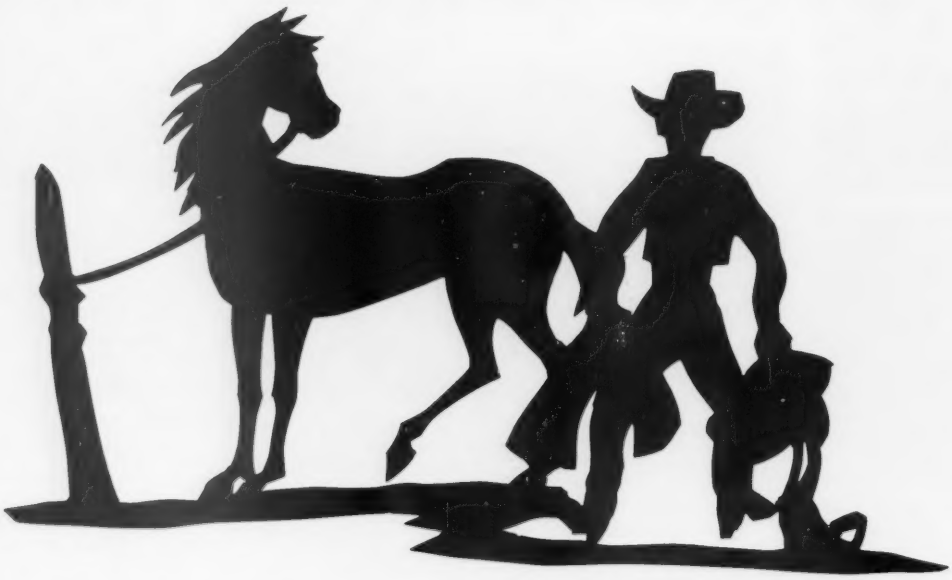

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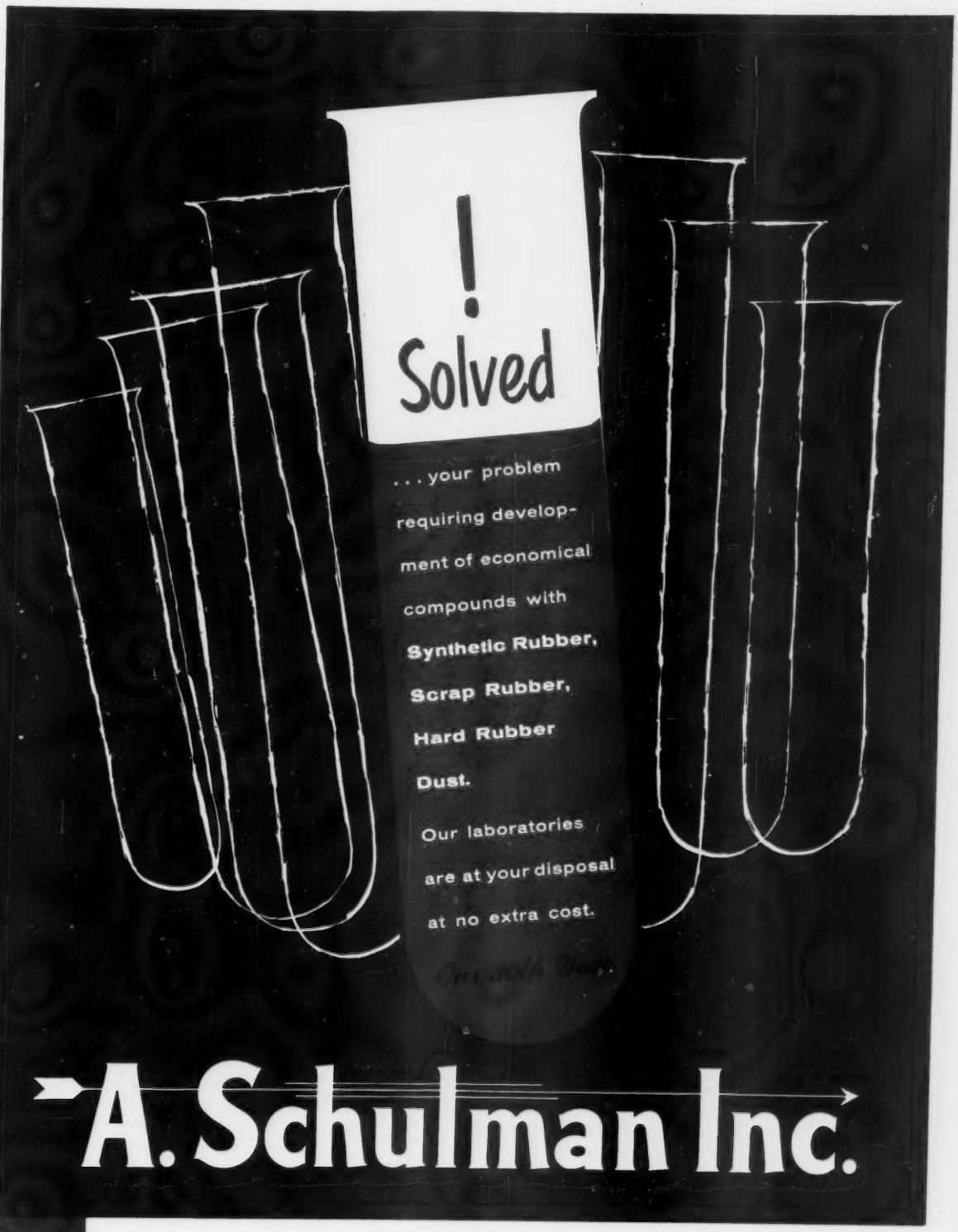

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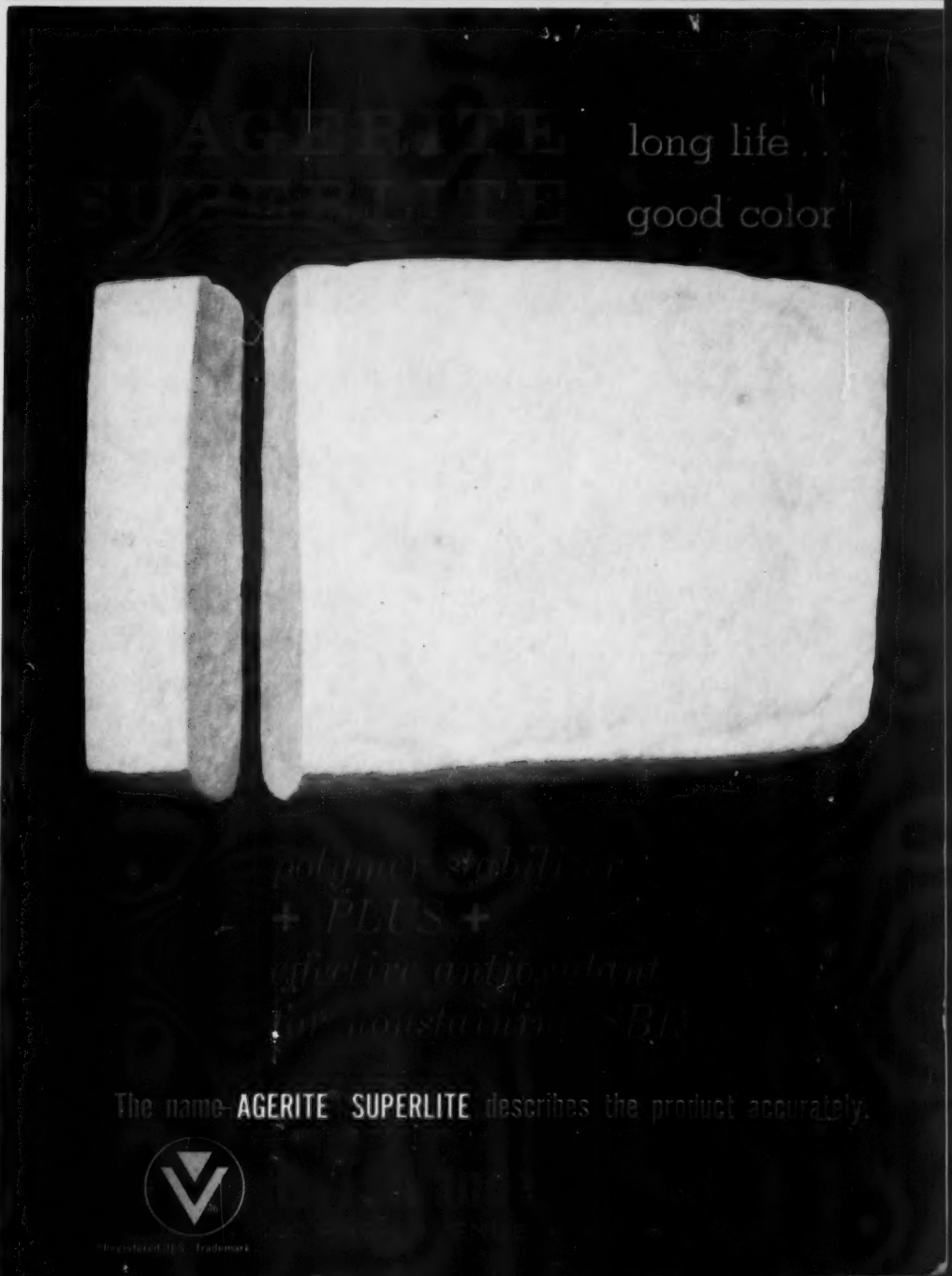
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